RAILROAD GAZETTE

FRIDAY, OCT. 18.

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Contributions.

Snow Sheds on the Central Pacific.

Southern Pacific Co.,
SAN FRANCISCO, Oct. 9, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The maximum annual aggregate snowfall (as measured from time to time during storms) on record since the year 1870 along the line of the Central Pacific Railroad over the Sierra Nevada Mountains, is 63 ft. After thoroughly experimenting with various forms, sizes and weights of the ordinary type of pushing snow plow, it was found impracticable to keep the road clear with such appliances, and the higher portions of the Central Pacific line (viz., from a point near Shady Run station, 4,160 ft. above sea level, eastward over the summit at an elevation of 7,017 ft., to near Truckee, an elevation of 5,819 ft.) was protected by snow sheds constructed during the years 1868 and 1869. The total length of sheds built was about 37 miles, 30 miles of this distance being practically continuous sheding.

These sheds are protected against disasters by fire by watchmen patrolling through them on short beats day and night, by special watchmen stationed on a high mountain top overlooking some 25 miles of the road, and by fire trains (a locomotive with steam fire-pump and water-tank cars attached) stationed at different points at all times ready for service. A district telegraph and telephone system for controlling watchmen, and a Gamewell fire-alarm telegraph system are also used in connection with the fire-protection service. As often as twice a week during the summer season one or more fire trains are sent out to thoroughly wet down the upper portion of the shed most exposed to danger from fire by sparks issuing from locomotive smokestacks, and the losses resulting from this particular source of danger have been very small; the greatest danger, and the one most difficult to guard against, being forest fires originating at a distance from the line of the railroad. From this cause during the present season a little over a mile of sheds was destroyed near Cascade station, 6,500 ft. above sea level, at a section of the road not endangered by snow slides. We intend, merely as an experiment, to leave this mile section of the road open until the next severe winter, using a steam plow to keep the track clear of snow. Should we find it possible to handle the snow successfully at the point in question in the heaviest storms with the modern machine plows, we may take down about 20 miles of the shedding, leaving only that portion of the road exposed to avalanches protected by snow sheds and galleries.

W. G. CURTIS,
Asst. to General Manager.

[This letter explains a newspaper paragraph that has had some circulation, to the effect that the company had decided to abandon snow sheds, and rely upon some form of machine snow plow to keep the line clear.—EDITOR RAILROAD GAZETTE,]

The London & Northwestern Railway.

Mr. George Findlay, General Manager of the London & Northwestern Railway, has recently published a book describing the organization and operation of the great railroad system under his charge. A brief review of this book appears in our department of New Publications. The particulars which follow have been selected from many more, of perhaps equal interest, which are found in that volume.

The executive management of the line is carried on by a general manager, a chief goods manager, with two assistants and a superintendent of the line with one assistant. The superintendent deals with the working of trains and all things pertaining to the movement of the traffic. The entire system is divided into ten districts, each under the control of a district superintendent. Each of these officers has under him an assistant and several traveling inspectors, who regularly visit every station and signal post, make reports of all that goes on, and are encouraged to make suggestions concerning the working of the trains, the avoidance of irregularities, etc. In each of the six more important districts there is a district goods manager, who relieves the superintendent of the management of the freight business, except as to the working of the trains. This principle is followed out with the agents of the more important stations, at 180 of these there being a station master and a goods agent.

Every month there are held two conferences. One, the officers' conference, is presided over by the general manager and attended by the chief officers at headquarters and all of the district officers. This conference discusses train service and mishaps and irregularities in working; and proposals for alteration of rules and improved arrangement for working traffic are there debated. The other conference, which also meets once a month, is called the goods conference, and is presided over by the chief goods manager. This conference concerns itself with questions relating exclusively to the conduct of the freight business, such as mileage, demurrage, claims, etc. These conferences are considered a very essential and valuable feature of the management of the system.

The working staff consists of 55,217 persons, of all grades. The practice of the company is to appoint lads of about 14 years of age as porters, telegraph boys and for other similar employments. These lads grow up in the service, and by the time they reach manhood have become experienced in the duties of their various departments and are eligible for filling posts that may become vacant. The most scrupulous attention is paid to the training of signalmen, who are never entrusted with the sole charge of signals until they have received a specific course of instruction in their duties. Their appointments are not confirmed until the superintendent of the division certifies to having examined the men and found them qualified for their posts, including in their qualifications freedom from color blindness. The passenger train guards are usually chosen from the porters and the freight train guards or brakemen from switchmen, yard porters and men of that class, but all are subjected to a rigid examination having regard to their general intelligence and character as well as to their special knowledge and experience. The engine drivers begin as boys in the engine sheds, where they are employed as cleaners, and from which occupation they go through a regular course of promotion.

Several funds or societies have been established to make provision against the results of accidents, sickness, death or old age. The superannuation fund has a membership of 5,610, and the London & Northwestern Insurance Society a membership of 38,055. An offshoot of this, the London & Northwestern Provident Society, has 22,000 members. The men employed in the locomotive department are not admitted to these societies, but have two of their own, which number upwards of 15,000 members. Besides this they have a pension fund with 12,500.

The maintenance of way organization begins with the section gangs. Three men, with a foreman, have charge of about two miles of double track. Every 10 or 20 of these gangs are under the direct supervision of an inspector, who has a district of from 20 to 40 miles. These inspectors, in groups of seven or eight, are under a chief inspector, who has from 200 to 250 miles. He has also traveling gangs of trackmen, who are employed in renewals, alterations and additions. Each of these divisions has its complement of mechanics, masons, blacksmiths, etc., who make repairs of bridges, tunnels and buildings. All of these men, with the chief permanent way inspector, are under a civil engineer. There are eight of these divisions on the London & Northwestern, the divisional engineer reporting to an assistant engineer, who is under the engineer-in-chief of the company. The section men have the same class of duties as men in similar positions in the United States. Periodical meetings of the division engineers are held, at which questions arising in their duties are discussed.

The signaling of the London & Northwestern is a very important department. The signal shop at Crewe is 280 x 85 ft., the machine tools being driven by an Otto gas engine of 48 horse-power. Here nearly everything for the signal equipment is made from the raw material. The posts, of Baltic timber, are 6 in. square at the top and from 9 to 15 in. at the bottom, according to their height. About 7 ft. at the foot of the post is left full size, charred in a furnace and coated with gas tar. On the top of the post is a galvanized cast-iron cap. The semaphore arm is made of a steel plate, stiffened by two longitudinal corrugations. The Crewe shops turn out about nine signals a week. The interlocking frame used by the company is, we believe, of the Stevens type. Trailing points are worked up to 660 ft. from the cabin and facing points up to 450 ft., and in some exceptional cases 540 ft. The ground connection is made to the switches not by gas pipes, as is the almost universal practice, but by a steel channel section manufactured for this special purpose. These steel rods are made at Crewe, about 18,000 ft. being turned out every month. They are cut to 18-ft. lengths and joined by fish-plates rolled to fit the channel. The rods are painted red.

There are on the whole system 1,400 signal cabins, with 30,000 levers and 16,000 signals. The steel rods would reach from Land's End to John O'Groat's, while the wires which connect the signals would reach from Liverpool to New York. The largest interlocking apparatus ever built at Crewe is one of 180 levers at Rugby. The signal lamps are lighted by gas where it is readily obtainable, but the greater number are lighted by petroleum oil.

For the purpose of maintenance of the signal system it is divided into 11 districts, each of which is in charge of an inspector. Under these inspectors are 21 sub-inspectors and foremen, 68 chargemen and 430 workmen. The districts are subdivided, and each subdivision is placed under a "chargeman," who, with an assistant, visits every signal cabin once a fortnight, cleaning and oiling the fittings and making small repairs. The name and address of each chargeman is posted in each signal cabin, so that he may be at once summoned if required. Each cabin is visited once a month also by a fitter and his assistant.

Opening of the Thames River Bridge.

Thursday, Oct. 10, the formal opening of the Thames River Bridge took place at New London, Conn., according to the announcement made in our issue of last week. A special train from New York and another from Boston carried a very large number of guests. These trains were made up of Wagner-built cars which had never before been run. The trains are to be put on the regular service of the Shore Line between New York and Boston. The cars are very elegant and complete, and up to the latest standard of passenger equipment. They consist of combination baggage and smoking cars, day coaches and parlor cars. The coaches are finished throughout in mahogany, and have handsome platform gates. The day coaches have Hale & Kilburn seats and the parlor cars revolving chairs. All are lighted by the new Pintsch lamp, which was shown in the *Railroad Gazette* of April 5, 1889. Platform lamps are also provided. The light was soft and brilliant, and it was possible to read in almost any part of the car without inconvenience.

The guests who went by these trains included several governors and ex-governors of states, the Railroad Commissioners of Massachusetts and Connecticut, and a large number of railroad officers and prominent citizens. The train from New York crossed the bridge and about a mile beyond it met the Boston train. The two returned together, leaving the Boston train on the eastern end of the bridge and the New York train crossed to the west end. The draw was then swung open and the old transfer steamer "Groton" went up and back through the draw, the band stationed on the bridge playing Auld Lang Syne as she passed. Mr. Boller, the chief engineer of the bridge, then made a brief speech, delivering the bridge to the railroad company, and President Babcock, of the New York, Providence & Boston, replied. The mayor of New London made a short address.

The guests were then taken on board the steamer "Connecticut," where a handsome luncheon was served, after which speeches were made by President Babcock, President Choate, of the Old Colony; President Clark, of the New York, New Haven & Hartford; Mr. Boller, Colonel Monroe, who has been Resident Engineer in charge of the bridge work; Governor Ladd, of Rhode Island; Mr. Brandegee, attorney of the New York, Providence & Boston, and others. Mr. Miller, General Manager of the New York, Providence & Boston, was the Master of Ceremonies of the whole occasion. The bridge is a beautiful structure, and the occasion was generally accepted as one for especial congratulation to its engineer.

Fifteen-Ton Derrick Car.

As in other details of railroad equipment and tools iron and steel are gradually taking the place of timber, so it is in the case of tools for wrecking and railroad building. The 15-ton derrick car illustrated, built by the Pennsylvania Railroad, is in the line of this evolution. It is constructed entirely of iron and steel excepting the flooring, tool boxes and bumpers. The design shown is for the single derrick. Others have two cranes mounted on the same frame; one over each truck.

It will be noticed that this crane has two sets of lifting apparatus, one intended to lift heavy bodies, up to 15 tons in weight, by means of the gears and chains, the other intended to pull up parts of cars and small pieces which are down an embankment. This last is accomplished by attaching a locomotive to the rope which is attached to a wrecking hook, as shown, and extends over the end of the jib to a pulley at the top of a post, down through the centre of the post and out horizontally at the base, either to the rear as shown at *A*, fig. 1, or to the front of the car through an opening on the front of the post. When the locomotive is pulling the brakes are set on the car and clamps *B* are attached to the rail. When heavy loads are carried by the gears and chains, the supporting jacks *D* are placed in position. When not in use these jacks are swung upward on the pivot pins shown at *E* and attached to the hook and chain shown at *F F*. Fig. 1 shows the derrick car ready for use, fig. 2 is an end elevation and fig. 3 a plan.

The longitudinal sills of this derrick car are made of 12-in. beams; these are attached to 9-in. channel-iron end sills by means of rivets and bent knees. The transoms at the trucks are made of 12-in. I-beams under the derrick, and 9-in. I-beams over the truck at the other end. The longitudinal sills are continuous from end to end of the car, and, therefore, the transoms are cut at the longitudinal sills. At these points the joints are made by bent knees, as shown at *G*, fig. 3. A substantial support for the side bearings is made with channel irons and knees between the side and centre sills, as shown at *H*. The base of the derrick is formed of a large casting fitting in between the transoms and sills and secured thereto by bolts. The bottom of the casting fits into the truck centre, as shown at *J*. The draught rigging shown on this car is one of the older forms. These cars are now fitted with the Graham gear, which has proved itself to be superior to all others yet used by the

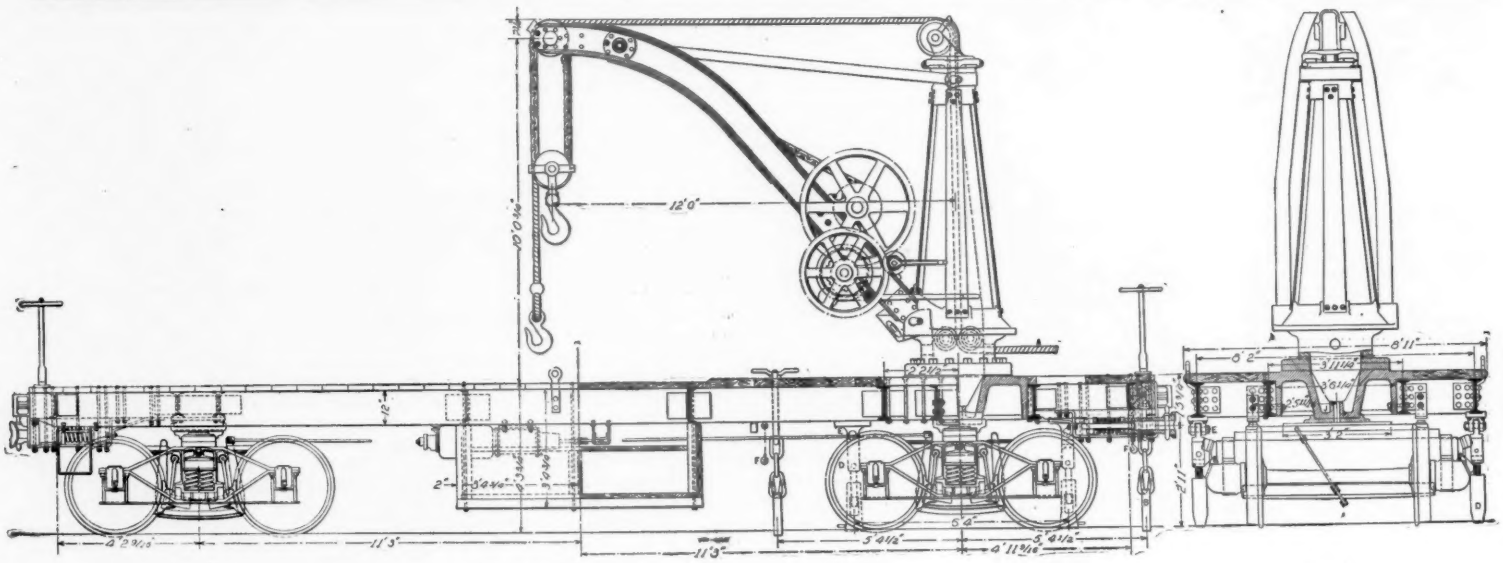


Fig. 1.

Fig. 2.

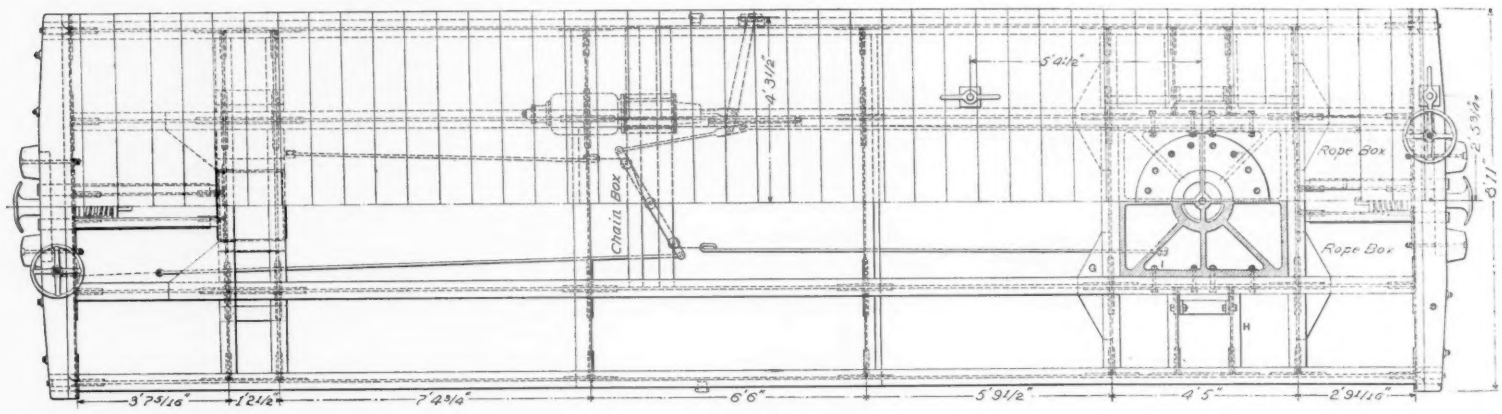
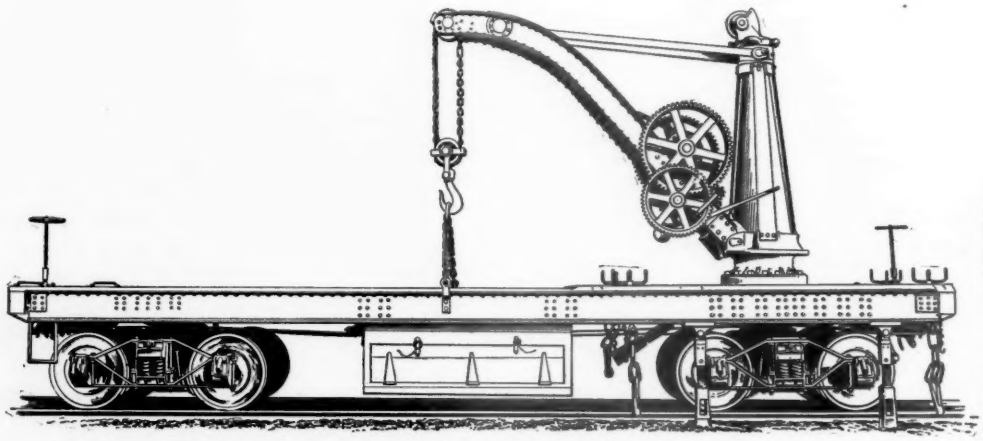


Fig. 3.



FIFTEEN-TON DERRICK CAR.

Built by the PENNSYLVANIA RAILROAD CO., *Altoona Shops.*

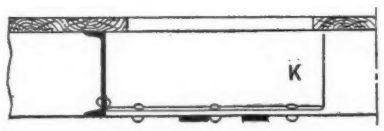


Fig. 4.

Pennsylvania Railroad. This car is fitted with air brakes, with the brake levers arranged at one side of the car in order to make room for the large tool and chain box show underneath the car. In the floor, just over the tool box, in the chain box, the construction of which is shown in detail at *K*, fig. 4. At the end of the car, where the derrick is located, are two rope boxes in which the rope is coiled when not in use. These are shown in fig. 3. The track clamps and jack attachments are too clearly shown to need further description. It will be noticed that a wooden buffer is placed outside of the channel-iron end sills.

The details of the cranes are shown in fig. 5, the elevation, fig. 6, the plan, and fig. 7, the detail of the rope carrier and friction wheels on which the derrick rotates. The following is a description of the derrick and its details: The post is made of cast iron and extends from the centre casting, to which it is attached by bolts, upward to the cap casting at *L*. It is faced where the friction rollers travel, as shown at *M*, fig. 7, and where the cap fits on at *L*, fig. 5. Surrounding the post at the bottom is a ring in which the friction rollers have a bearing and to which the bottom of the boom is attached. This ring is shown at *N*, fig. 5, and *O*, fig. 7.

The attachment of the boom is by a pin 2⅝ in. in diameter passing through the end of the boom, which is thickened up at that point by a plate fitting in between the flanges on the boom and riveted. This plate has a hub on it which, with the thickness of the web of the boom, fills the space between the jaws into which the boom is inserted on the annular base. The pin which passes through these jaws has an oblong, one-sided, flat head through which a small tap-bolt passes, as shown in fig. 5, and secures the pin in position. This method of fastening is superior to a large tap-bolt for a pin bearing, and can be more readily removed.

Extending upward parallel with the inclination of the post are wrought-iron straps 8 in. × ⅜ at the lower end where secured to the ring, and 5 × ⅜ where secured to the cap. The object of these bars is to keep the cap in position and at the same time, by reason of the flexibility of the bars, allow it to assume slightly different positions, when under a load, without danger of rupture of any part. The cap consists of a large casting bored out 10 in. in diameter to fit over the end of the post, and has bearings cast thereon for a pulley over which the rope passes. Around the cap is a ring containing eyes 2⅝ × 4¾ in. This ring is made in two parts, fastened by clamp bolts, as shown at *Q*, fig. 5. The cap also has jaws, one on each side, to receive the tension bars, which hold the boom in position under a load. These bars are fastened with pins similar to those which secure the boom at the base. The tension bars are secured at the outer end to a large pin, 3½ in. in diameter, passing through the booms, as shown at *R*, fig. 6. At this point the tension bars are prevented from slipping inward by two hook bolts, and the booms are strengthened by plates with bosses at an angle, riveted, as shown in fig. 5 at *S*.

The booms are made of steel I-beams, 10½ in. deep, with flanges 4⅛ in. wide. They are stiffened by plates riveted on to the top and bottom flanges. These plates are 5 in. wide and ⅜ in. thick. At the end of the boom the webs are strengthened by plates with bosses riveted on, through which passes a 3¼-in. pin, which forms a bearing for the rope and chain wheels. A guard over the rope and chain is placed at the end of the boom to keep them in position, and on the back of the chain wheel is a guard which also serves to keep the chain in position. The details of this are illustrated in figs. 5 and 6.

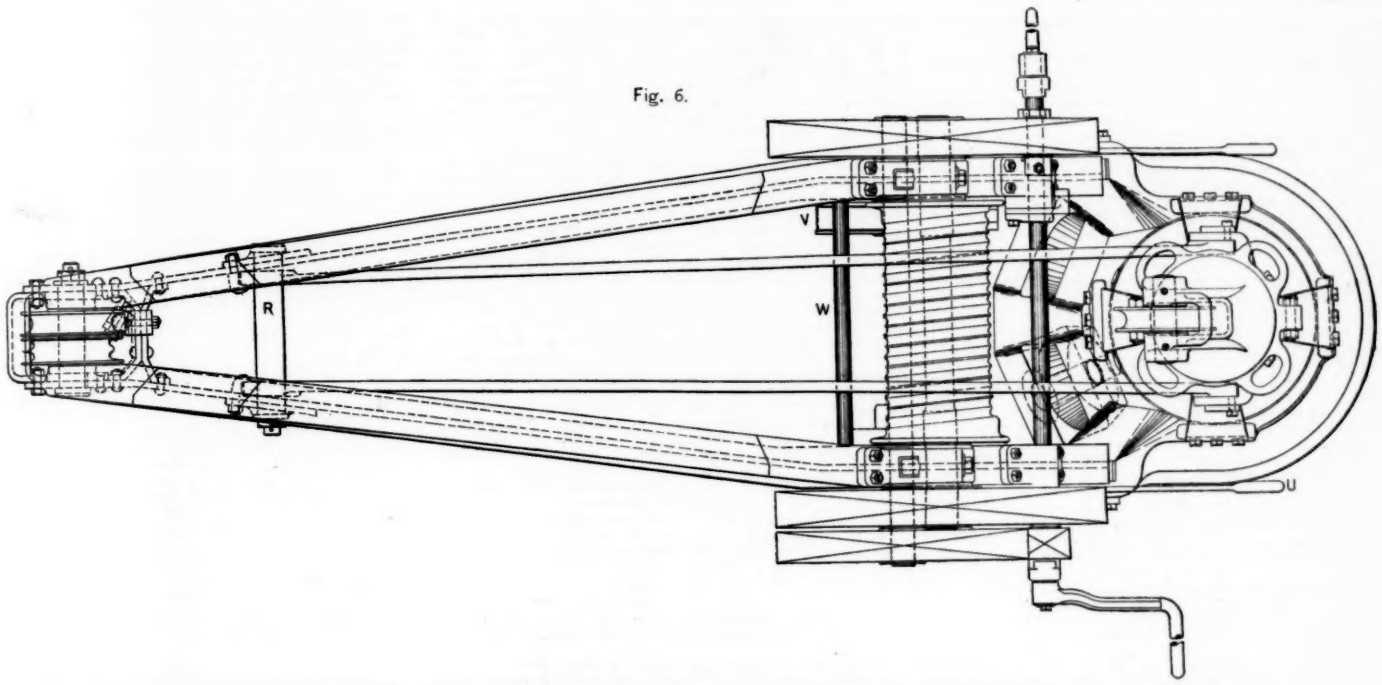
An ingenious method of oiling the rope wheels in the base of the post is shown in fig. 7. The bearings of the rope wheels are drilled out one-half of their length and piped to the exterior of the post, as shown at *T*, fig. 7 and fig. 5.

The chain-hoisting mechanism consists of a crank driving a pinion shaft on which are two pinions, one arranged to gear into a large spur gear having 63 teeth mounted directly on the shaft of the chain drum. The other pinion on the crank shaft gears into a spur gear on a countershaft which has 55 teeth, on the other end of which shaft is mounted a pinion having 10 teeth, and which gears directly into the spur gear before mentioned having 63 teeth, and which is mounted upon the train drum shaft. A duplicate to the large gear on the train drum shaft is mounted on the other end of the same shaft, and is driven by a pinion of the same dimensions as the one just described, both of which are mounted upon the countershaft. The object of this duplicate construction is to relieve the chain drum shaft of twisting strains when the load is at one end, and to divide the pressure on the teeth of the gear over a large amount of surface. It is evident that when the countershaft is in use the chain will move slower for the same number of revolutions of the cranks, and therefore the derrick will be in the condition to exert the greater amount of lifting power, and when the countershaft is thrown out of use the chain can be wound up rapidly. To accomplish the change from one speed to the other, the crank shaft, on which there are two cranks arranged at right angles, is shifted endwise, causing clutches on the shaft to engage corresponding clutches on the small pinions, and thus transmit the desired motion. The position of the crank shaft shown in fig. 6 is that in which the countershaft is in use.

A convenient brake for use in lowering heavy bodies is arranged to act upon a friction wheel *V* mounted upon the countershaft, and actuated by a handle *U* on either side of the crane, as shown in figs. 5 and 6. This friction brake consists of a steel band surrounding a friction wheel, and tightened by a differential crank motion obtained from two cranks of different lengths mounted on the same shaft to which are connected the levers *U*. At *W*, fig. 6, is shown a brace 1¾ in. in diameter, which holds the booms rigidly at a proper distance apart.

This is an admirable design of derrick for several reasons, not the least of which is that it is scientifically proportioned;

Fig. 6.



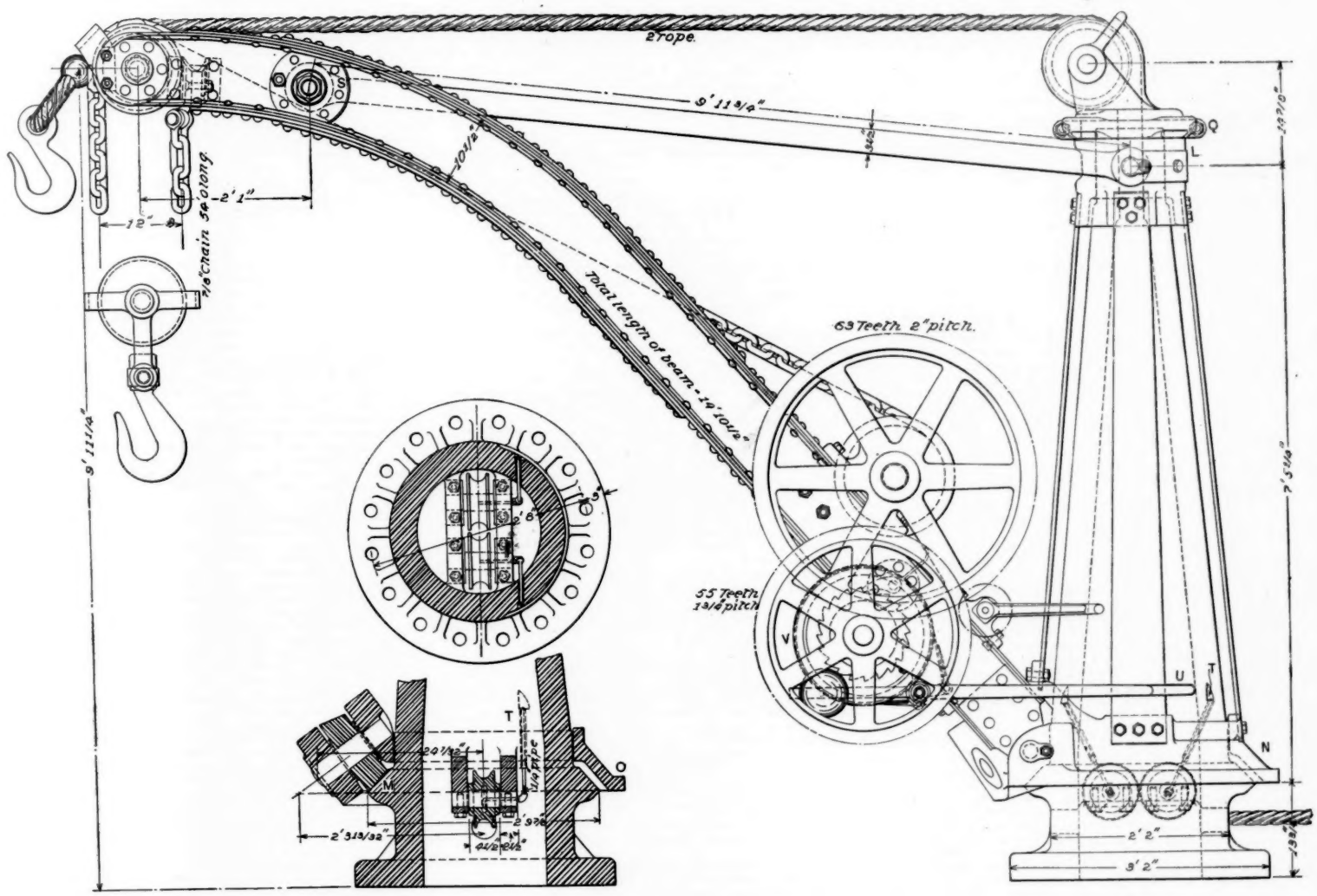


Fig. 7. Fig. 5.

FIFTEEN-TON DERRICK.

Built by the PENNSYLVANIA RAILROAD CO., *Altoona Shops.*

each part where the imposed stresses are susceptible of calculation has been designed with reference to such calculated strain. It is a pleasure to see theoretical mechanics properly used. The use of a curved boom allows large pieces to be hoisted well above the tracks. Particular notice should be taken, by those wishing to design derricks of similar character, of the floor sills and the transom, constructed as they are of steel beams, because they have been the subject of much consideration on the part of the designers. The gearing has only four different patterns of gears. This materially facilitates repairs. A few important dimensions not given in the cuts may be of interest.

Length of car over buffers	33 ft.	3¼ in
Length of car over dead blocks	34 "	3¼ "
Height of floor of car above rail	4 "	3¾ "
From top of rail to highest point of derrick	15 "	
Diameter of truck wheels		33 "
Wheel base of truck	6 "	4 "
Distance between centres of trucks	22 "	6 "
Overhang of boom	12 "	
Total width of car	8 "	11 "
Size of centre sills, I-beams	12 in. deep.	

Bill of Material for Jib.

2 pieces, 10½ in. I-beam, flange, 4 15-16 in. wide, 14 ft. 10½ in. long.
2 pieces steel 5 in. × ⅛ in. × 11 ft. 6 in.
2 " " 5 × ⅛ × 9 ft. 11¾.
2 " " 5 × ⅛ × 7 ft. ⅛ in.
2 " " 5 × ⅛ × 6 ft. 2¾ in.
1 piece ⅞-in. crane chain 54 ft. long.

Diameter of rope and chain wheels at end of jib	10 in.
" " bearing for same	3¼ "
" " rope wheel on top of post	10 "
" " bearing for same	2¾ "
" " rope wheels at base of post	6 "
" " chain drum	13 "
" " centre to centre of chain when wound on drum	15 "
Length of chain drum	30 "
Diameter of chain drum shaft	4 "
" " counter shaft	3 "
" " crank shaft	2 "

List of Gears.

2-spur gears, 4½-in face, 63 teeth, 2 in. circular pitch.
1-spur gear, 4 in. face, 55 teeth, 1¾-in. pitch.
3 pinions, 4½-in. face, 10 teeth, 2-in. pitch.
1 pinion, 4-in. face, 10 teeth, 1¾-in. face.
Length of hand cranks, 16½ in.
Diameter of rope 2 in.
Thickness of cast iron in body of post, 3¾ in.

Permanent Way and Rolling Stock—New England Railroad Club.

At the meeting of this club Wednesday evening, Oct. 9, 1889, President Richards occupied the chair, and announced as the subject for discussion at the next meeting, "Journals and Journal Bearings," and the subject for discussion at the present meeting, "Permanent Way and Rolling Stock, and their Relation to each other," to be opened by Mr. J. N. Lauder, of the Old Colony Railroad.

Mr. JAMES N. LAUDER: It would be profitable for us to look back twenty years and trace the improvements that have been made in the permanent way and rolling stock of railroads. Twenty-five years ago we had iron rails, the old-fashioned chair, cast or wrought iron; there were no fish-bars, or but very few, if I am correct as to the date. We find to-day that the joints of the rails have been improved, and there are not many of the old joints in use now. On the other hand, I think the rolling stock has been equally improved. Twenty-five years ago an engine of 30 tons was considered heavy. I remember the road I was connected with bought passenger engines weighing 30 tons, run them one summer, and then sold them because they were too heavy.

I want to say a word with regard to the influence that

clubs and associations, especially mechanical associations, have exerted in bringing about a better state of things in railroad affairs. Of course, I do not ignore the fact that steel has made it possible to do things we could not otherwise have done. Steel tires and wheels have helped our rolling stock immensely, but another factor has come in. Twenty-five years ago every railroad was a law unto itself; every man in charge of rolling stock got up his own designs, and carried out his own notions, perhaps got a good many of his cranky notions into his rolling stock, gauged his wheels to suit his ideas, the lateral motion varying from ⅛ to ⅝ of an inch. The associations have created a great change. [Mr. Lauder then briefly reviewed the work of the Master Car Builders' and the Master Mechanics' Associations in establishing standards.]

The roadmasters have an organization four or five years old, and have done good work as far as they have gone, and I hope they will make their organization as much of a power in their profession as the Master Car Builders' have in theirs. There is no question that the reports brought out at their conventions will lead to greater uniformity in the construction and maintenance of the permanent way. * * * I find there is a great diversity of opinion as to the proper section of rail. * * * We rolling-stock men have designed and put in force a certain section of wheel tread and a certain section of flange; we have arrived at that after years of observation, and we find that it is correct, and that is the best possible shape for the tread of the wheel; it has become well established, and I don't think anybody proposes to make a change in that. I think it is incumbent upon the engineers and roadmasters to settle on a standard rail head, and after years of observation and experiment it seems to me that we are far enough advanced to-day to have a section of rail designed for these different weights that shall be a standard for the whole country. Of course, there will be the same trouble in arriving at a standard as there has been in getting standards for our rolling stock, arising from differences of opinion and the belief of each designer that his is the best form. I think it took the Master Car Builders' five years of constant labor and effort to adopt the standard axle, but it has proved a great benefit, notwithstanding its defects. I believe the same benefit would result from the adoption of a standard rail section. The Master Mechanics have adopted recently standard driving-wheel centres, which are being rapidly adopted by the different roads, though at first they were greatly opposed by many of them; so that in a few years it will be possible for any tire maker to pile up thousands of tires in his yard, knowing he can sell them, because they are standards, and fill his orders promptly. You can buy thousands of standard axles that can be shipped within twenty-four hours. If there were at the same time a standard section of rails of different weights, it would enable the rail manufacturers in dull times to make them and pile them up, and be ready to fill orders at short notice; and this would also be a great advantage to the railroads, because they would make the manufacturers carry the stock instead of carrying it themselves, as they are now doing with the tires. Now at times a road which cannot wait to have rails manufactured to order will in case of emergency take a rail slightly different from its standard; those rails will get mixed with others, and the fish-bars will not fit, and trouble ensues. The very essence of any road is to have a well-fitting fish-bar. Although it is not in my department, I am interested in having a good track, good switches, good frogs, and everything good that pertains to the track, because my rolling stock will stand up and work longer and with less repairs than on a rough track. The roadmasters are interested in the rolling stock in the same way, in having tires well turned, in having the right kind of flanges, and everything about the rolling stock in good order. I suppose there are roads in New England and out West that still use the barbarous stub switch, but I don't see why they should when there are other switches so much safer and better and I believe cheaper. I want to declare myself against the stub switch. * * * I think the roadmasters should agitate the matter until they get something better adopted universally.

The President then introduced Mr. Wm. F. Ellis, of the New York & Providence Railroad, and Secretary of the New England Roadmasters' Association.

Mr. ELLIS: What is the Permanent Way of a Railroad? It is the rails as laid in its tracks to a standard gauge, with numerous switches and frogs, an alignment of tangents and curves, through cuts or upon fills of stone, gravel and dirt, its bridges of stone, iron and wood, upon which the rolling stock is expected to pass in an easy, smooth, fast and safe manner, with as little wear as possible, together with its buildings and signals. In this discussion I confine myself to what should be used to maintain the permanent way in the New England states. The rail to be used should be as per resolution passed in 1888 at the meeting of the New England Roadmasters' Association: "never be less than 72 lbs. per yard, but as much heavier as we can secure. * * * The best form of rail section is, as to size, 4¼ in. high by 5 in. base, and the form to fit the flange of the wheel as nearly as practicable, with no sharp corners, and top of rail flat enough to give at least 1¼ in. for wheel friction. Rails should be curved before laying on any curve that exceeds two degrees with some form of machine that shall not produce a sudden concussion on the rail. Suspended joint is best. The broken joint is preferable."

To this resolution I would add: The form of rail section should be such as to allow in the process of rolling the metal in the rail head to be nearly of the same temperature as that in the web and base, thus insuring the same hardness, and free from flaws. The angle-bar joint to be used not over 24 in. long, of such weight and shape as not to break and to give proper support to the same. The ties to be not less than 8 ft. long, 7 in. thick, with face of at least 7 in., using at least 2,800 to the mile.

The split switch with the automatic stand, with a flexible tie or switch rod, to be used, not only on the main track but in the renewal of side-track switches where there is any amount of switching done, and at side-track switches where a derailment from an open non-safety automatic switch would stop the traffic on the main track. I would also recommend a guard rail to be used at the points of all split switches not trailing switches, and the use of a spring rail frog in all cases except where there is nearly the same wear on each wing of the frog, and at yards where the rigid rail frog is to be used.

The guard rail at frogs, as adopted at the 1887 meeting of the New England Roadmasters' Association, is "Length, 12 to 15 ft., curved a true curve, with a radius of 150 or 175 ft.; centre of guard rail set six inches ahead of point of frog, securely spiked, and fastened with three braces, one opposite the point of frog and one on either side."

This would be a correct guard rail for rigid rail frogs, but for a spring rail frog the guard rail would have to be parallel to the main rail, with a flange-way of 1¾ in. for at least 9 ft. of its length at centre of same, and well braced its entire length.

The flange-way at frogs and guard rails as adapted at the 1884 meeting of the New England Roadmasters' Association is 1¾ in., and as per the guard-rail gauge, fig. 8 of Master Car-Builders' report at the 1883 meeting, 4 ft. 5 in. by 1¾ in. flange-ways. The alignment of the tangents once in 10 years, and especially of the curves once in five years, to be corrected by the transit. The elevation to be such as speed of trains and traffic demand. The ballast to be of broken stone when circumstances permit or good gravel, with proper drainage, and at least once in five years, in the surfacing of the track, slight raising where possible, and all highway crossings to be carefully cleaned out each year, renewing with fresh ballast. Culverts to be of stone, and covered with ballast, if possible. Where arches of stone, through cost or location, cannot be used, iron bridges should be, but calculated to carry with safety not only the weight of the present rolling stock, but a proportional increase, as the last ten years' progress has indicated what it may be; and with these bridges a floor and guard rail, to be used as recommended at the 1887 meeting of the New England Roadmasters' Association: "The ties be 10 ft. long, 8 × 8 in. square, 8 in. apart, secured in place by a timber 6 × 6 in. square, joined on to each tie near the outer end, and bolted firmly, an iron guard of railroad iron on the inside of the track rails and 8 in. from them, and approaching the centre of the track at about 30 ft. from the ends of the bridge, and connected together by the old point of a frog; that the long bridge ties for a distance of about 30 ft. be put in on the ground at each end of the bridge, and the outside guard rail be extended, spreading at the ends about 3 ft. outside from the main track rail."

To this I would add the use of a re-railing device, and suggest the use of the Bush bolt and nut or the Davis steel lock spike in the spiking of the main track rails to prevent creeping.

I will take up only the relation of the form of tread and flange of the wheel, when new and worn, to the frogs, switches and guard rails of the permanent way. * * * I would state here (see page 156 M. C. B. Report of 1888) the standard distance between the backs of the flanges of car wheels is 4 ft. 5⅝ in., as approved by letter ballot in 1883, which gauge was very satisfactory to the permanent way; but a committee in 1885 recommended in the fitting of wheels to axles a variation of ¼ in. each way, from 4 ft. 5½ in. as a maximum gauge, which was also adopted by the Association.

Please bear in mind the gauge of track is 4 ft. 8½ in.; gauge of guard rails, 4 ft. 5 in., as adopted by both associations, thus allowing ¼ in. leeway for discrepancies in gauge of wheels and guard rails. But in the same report for 1888, page 185, under Code of Rules for Interchange of Cars, we find: "Cars may be refused if their wheels measure less than 4 ft. 5 in. or more than 4 ft. 5⅝ in. between backs of flanges," thus allowing for no discrepancies in the gauge of wheels and guard rails, with which inspection the wheels have ⅜ in. for variation in their favor, the guard rails and wing rails of frogs none.

We will now suppose the guard rail and frog are in proper condition and correct gauge 4 ft. 5 in., and a train of cars properly inspected as per "Code of Rules" passes through the relation to each other is friendly, and no damage is done. Another train passes in which there is a car or cars that have failed of correct inspection or are loaded with heavy machinery or bulky freight received from a foreign road without inspection, and the gauge is 4 ft. 4⅝ in., or 4 ft. 6 in., the relation becomes antagonistic and mischief commences by an effort to pull the frog to pieces or loosen the guard rail for the permanent way, or in bent axles and broken flanges for the rolling stock, and soon the guard rail will become loosened. I ask the question, What shall be the remedy?

Now take a car with wheels as shown in fig. 2 [cut not reproduced], even with correct gauge, the stock rail of the split switches, the wings and points of the frogs are being damaged, with a good chance of a broken flange to the wheel. I ask the question, Is there not a brake-shoe that can keep to a certain extent car wheels from such condition? Or what shall be the remedy?

Now, assume an engine with double flange blind driver, 6 in. wide, only ¼ in. deep of flange, will with the 72-lb rail section in use on my road just fit in and disturb the guard rail but very little; yet the frog will suffer; but if the main rail has cut into the tie ¼ in., or has its head worn down ¼ in., this driver will strike the guard rail as shown in fig. 7, also will give the main rail at split switches hard wear. If the gauge of these blind drivers is less than 4 ft. 5 in., the guard rails as well as frogs and switches will be injured very much more.

Shall the remedy be as suggested in the editorial of the *Railroad Gazette* of Aug. 23, 1889, in an article entitled "Plain Ties, Frogs and Guard Rails," the roadmaster to have authority to order into the shops any engines that he catches running over his frogs with double flanges? Or what shall the remedy be? I have failed to find in any report of the Master Car Builders' Association what depth of hollow is allowable before the same should be rejected for use, and I ask for information on that point.

Mr. LAUDER: Mr. Ellis asks if there is a brake-shoe that will keep the tires in comparatively good condition, as they are worn away by the rail? There is a brake-shoe, called the Ross shoe, which has a bearing on the flange and on the outer side of the thread of the tire, and has another bearing on the part of the tire which usually comes in contact with the rail. I believe that no engine should be run without a driver brake; and if it is equipped with a driver brake which is used as it should be, the Ross shoe will keep the tire in very much better shape to meet the requirements of a well-fitting tire to the rail, than if it is allowed to run without a brake-shoe.

The other question he was asked was if we had any rule to determine when a driving tire shall be taken off and turned. It would perhaps be as difficult to have a rule for that as for him to have a rule for taking out rails when they are worn to a certain depth, or get a hole in them to a certain depth. * * * I believe it would be economical for all railroads to turn their tires much oftener than they usually do; but when business is heavy we cannot spare our engines for that purpose.

Mr. BISHOP: I consider it very important to harmonize the track with the running of the trains. There are many things to be considered in this matter, one of which is the speed at which the trains pass over the track. With a high rate of speed the tendency is for the wheel to press more closely to the outer edge, consequently the rear of the flange, passing over the inside rail, will come in contact with the wing of the frog and cause a sudden jerking with a heavy train running at 50 or 60 miles an hour. Then a train passes over the track at a speed of 30 miles an hour, and perhaps the engineer will not experience any jerking sensation in going through the frog. The engineer running at 60 miles an hour will report some trouble with the frog, and then comes a freight train, which is limited to 12 or 15 miles an hour, and that sags over to the inside rail, and then there is another difficulty. There are many things to be taken into account after we have got the standard rail and the standard car. I think the time is coming when the track department will receive more attention, and be considered of the first importance in railroading.

Mr. CLARK: I have brought with me a piece of rail (showing a piece of rail very badly damaged) that was in the track this morning 10 ft. from the point of the switch. I claim that the tire that will wear a rail into that condition is not a safe tire to run over a split switch. That rail has been in the track 18 months. I believe that the split switch at the point should not get so much damaged as to have to be taken out under less than three years, or that anything like that should occur within that time. What is wanted is to adze down the tie in the main track; the rail has been crowded into the tie so as to allow the driver to strike it. I don't think anything does so much damage to a split switch as a hollow double-flange wheel. I don't think this piece of rail is an exceptional case; you can find such on roads anywhere that use split switches, though I think that is the switch for us to use.

Mr. WHITNEY, of the Intercolonial road: It is very rarely the case with us that we have a tire worn down so that you can call it a double-flange tire. We don't allow them to run so long; we have occasionally let them, and had broken crank-pins and broken switches. I think it is good economy, not only for the track, but for the rolling stock, to keep the tires in good order. It costs something, to be sure, not only to do the work, but in the loss of the engines for the time—a considerable item if the road is busy. We never let an engine run to the extent that it is indicated they are here on some roads. I think it is important to have the shape of the rail and the wheel to conform as far as possible.

Prof. SWAIN: There is a difference of opinion as to what the relation between the wheel and the head of the rail should be, as to whether the rail should fit the wheel or not. I am glad that Mr. Lauder has advocated so strongly the use of the driver brake, because there is no safety appliance on a railroad which prevents so many accidents as the brake. Of course, to add driver brakes increases the braking power of the train. I am sorry to see new cars with 6-wheel trucks supplied with the old 4-wheel brake. It seems to me there should be a brake on every wheel, and I hope the time will come when trains will be so equipped.

Compound Locomotives—Western Railway Club.

At a meeting of the Western Railway Club, Oct. 15, Mr. D. L. Barnes, of the *Railroad Gazette*, read the following paper:

In the absence of one of our body who was expected to read a paper on the subject of compound locomotives, I have been requested to prepare a short disquisition on a few of the general features of that class of engines. It is to be regretted that a subject so important has to be limited to the short time which can be alloted to subjects before this club at any particular meeting, and, therefore, realizing the great amount of time consumed in even the shortest mathematical discussion of such a subject, and believing that in the locomotive class of compound engines mathematical discussion is neither necessary nor as fruitful of valuable results and conclusions as simpler investigations made with the aid of the actual performance of common locomotives, this short review of the subject has been arranged in simple form. When this topic is first presented to a railroad man, his impression will often be that it is another "craze" which will soon die out like the Fontaine, Shaw, bicycle, and other schemes to revolutionize locomotive construction. One cause of this is that we have all held till recently the opinion, taught by the engineers now advocating compound locomotives, that no advantage could be obtained by compounding an engine unless a condenser could be attached to the low pressure cylinder, thus securing the assistance of a vacuum. For years this was the theory of all, and and to-day it is still the theory of many. The correction of this error has been the result of the labors of the United States navy, the Massachusetts Institute of Technology, the Stevens Institute, the Sibley School of Arts, the Westinghouse Engine Co., and other experimenters on this side of the ocean, and of many experimenters, particularly in marine engineering, on the other side.

The simple reasoning which leads to a belief in the economy of using a high and a low pressure cylinder without a condenser is as follows:

We all know that in any simple engine with one cylinder, it is more economical to cut off steam at one-quarter than at one-half stroke, also that it is more economical to cut off at one-quarter than at one-eighth stroke. We know this, because—using the most conclusive reason—by actual trial we have found it to be so. Abstract theory is unnecessary to tell us this. By actual trial, then, we well know that there is, in any cylinder, a point at which if the entering steam is cut off the greatest economy will result. If the steam is cut off earlier than this point, or later than this point, then the work done per pound of steam used will be reduced. We also know beyond dispute that the total work which ought to be obtained from the steam used can only be secured by an increase in the amount of the expansion of that steam.

Hence, we find ourselves in this predicament; to obtain the greatest amount of work from a given amount of steam, it is necessary to cut off at the earliest point in the stroke which will assure just sufficient pressure at the end of the stroke to blow the fires. But—and therein the difficulty lies—we have found by experiment that to cut off at such an early point results in a loss from various causes. These causes have large names, and, owing to the dispute existing regarding which one of the causes, or sets of causes, is the chief source of the evil, it is best to neither name nor consider them in a simple discussion of the subject. It is enough for all practical purposes connected with the locomotive for us to know that the most economical cut-off in locomotive cylinders is not the one which will result in the reduction of the steam pressure at the end of the stroke to about the atmospheric pressure or anywhere near it.

It is the compound locomotive that is at present offering a solution of the problem, and a means of harmonizing the conflicting conditions. With it, the steam can be expanded to that pressure which will just blow the fires without using in either cylinder a cut-off that departs from the economical point to such a considerable amount as it would in the case of the simple engine. For instance, let us suppose that the one-quarter cut-off is found to be the most economical, then during the most economical operation of one cylinder, the steam will be expanded four times before being exhausted. If two cylinders be used, it will be expanded four times in the first and four times in the last, or in both eight times. The terminal pressure will then approach nearer to that desired without having in either cylinder reduced the cut-off much below the most economical point. It must not be thought that the economy, when two cylinders are used, is twice as great as before, because it is not so, either from a mathematical calculation or from results of actual trials. The best gain in economy that can be assured in a properly designed compound locomotive as a result of greater expansion, and from other savings dependent upon such increased expansion, is not far from 15 per cent.

The principal advantage resulting from an arrangement of two locomotive cylinders in series, one after the other using the same steam, is, as has just been stated, the possibility of expanding to a more advantageous degree without departing materially from the most economical cut-off in the cylinder. But there are other advantages resulting simply from the use of two cylinders.

The use of two cylinders permits the cut-off to be longer in either where the speed is high and but little work per revolution is required. This longer cut-off for the same work results in the use of the ordinary link motion at a

point where its action is more satisfactory. Moreover, the compression is much reduced. The back pressure in the low pressure cylinder is more nearly under the control of the designer of the locomotive, and exists more as the result of the use of the exhaust to blow the fires than because of the cramping of the port opening through which the exhaust must pass to reach the nozzles. A favorite way of running compound locomotives at high speeds has been to place the low-pressure valve motion in full gear and cut off as desired in the high-pressure cylinder. While this is not a method that would be considered scientific from a purely mathematical standpoint, yet it has some advantages, not the least of which is reduction of the amount of compression and back pressure in the low-pressure cylinder, and a tendency to offset some of the bad features of the Stephenson and other link motions when the engine is revolving rapidly.

Two indicator cards shown here, one of which is taken from a compound, the other from an ordinary locomotive, may render this point clearer. Fig. 1 shows a card taken from a compound locomotive at a speed of 50 miles

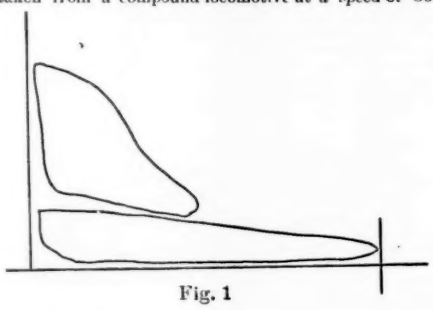


Fig. 1

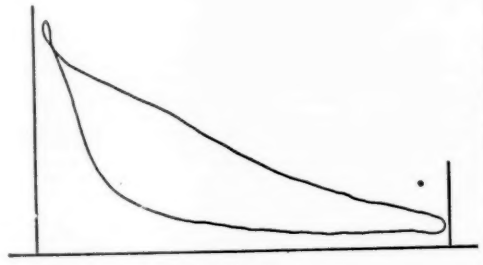


Fig. 2

per hour with a high pressure cut-off of 50 per cent., and low pressure cut off of 73 per cent. Fig. 2 shows an indicator card taken from an ordinary locomotive at 50 miles per hour at a cut-off of 25 per cent. It will be noticed that the steam line in fig. 1 from the compound locomotive is much superior to that on fig. 2 from the ordinary locomotive. The card is fuller, showing a better valve opening, and the expansion line is more pronounced. The back pressure is less in the case of the compound, but as these cards were taken from different locomotives they are not comparable in this respect because different amounts of back pressure may have been needed to blow the fires in the different engines, yet the difference shown is about what we may expect from indicator cards taken from the same engine before and after compounding, no other changes being made in its design. An important difference between these indicator cards lies in the compression line. In fig. 2 the valve commences to close the exhaust ports about midway on return stroke, and the resulting compression cuts off a large corner of the card, while in the case of fig. 1 from the compound engine the exhaust port closes suddenly, almost at the return stroke, and the position of the compression line reduces but little the total area of the card. Fig. 1 also illustrates the results of the favorite method of running compound engines at high speed by dropping the reverse lever of the low-pressure cylinder until the cut-off is nearly at a maximum. This condition places the valve gear in the best position for promoting the exit of the exhaust from the cylinders, and removes to a considerable extent one of the worst defects of the ordinary type of engine.

Another advantage, and one of the most practical, resulting from the use of two cylinders in series on a locomotive, is the great efficiency of the boiler as a result of a decrease in demand upon it for steam. This is brought about by the fact that the steam in a compound engine is used to better advantage, and each pound of it does more work than each pound in the case of the common locomotive. Therefore, for the same trainload less steam is used and less demand is made upon the boiler. This is no small advantage, as can be seen when one remembers how hard our locomotive boilers are crowded in comparison with the boilers used in stationary service.

We have now seen what are the three principal improvements which we hope to make by the use of two cylinders connected so that the steam of one enters the other instead of being discharged to the atmosphere. These improvements, as before stated, are, when simply expressed:

1. More economical use of the steam taken from the boiler, because of greater expansion.

2. Use of the steam to greater advantage, for the reason that the link motion is operated under more favorable conditions.

3. A decreased demand upon the boilers now in use, which, we all believe, will result in an increase of economy in the consumption of fuel.

The question now naturally arises, "To which of these three advantages does the compound locomotive principally owe its usefulness?" Only one answer can be given: "We do not know." It is the combined effect of them all, and experiments have not been made which show wherein is the greatest increase in economy. Of course, mathematicians are ready to show that the advantage is due to the increased expansion; but although familiar with their deductions, I am myself unable to say that, in the case of the locomotive, the principal part of the economy lies in that particular improvement. Therefore, being thus in doubt regarding the cause of the increased economy, it would be advisable for those who are contemplating the trial of compound locomotives, while perhaps not avoiding the study of the mathematical, or what might be called the theoretical, side of the subject, yet to incline rather to the more practical and tangible side, and proceed to make all deductions from the actual indicator cards taken from the present engines, and endeavor as much as possible to remove, while making the new designs, the three great evils of high speed locomotive cylinders and valve gear, viz.: The enormous compression, the high back pressure and the marked wire drawing of the entering steam.

Other advantages than those mentioned here will present themselves to you as a result of the decrease of the demand for steam from the locomotive boiler in its regular work, not the least of which is the reduction of one of the greatest evils in locomotive boilers as now constructed and operated, viz the large amount of water accompanying and suspended in the steam furnished the cylinders. All of the water which enters a locomotive boiler is not necessarily evaporated into steam. In some cases as much as 50 per cent. can go over to the cylinders in the form of water as a result of a much forced draft and a contracted steam space above the water in the boiler.

It may be interesting to know what is the simplest form of a satisfactory compound locomotive that has been devised. Such is the two-cylinder type, and in any case, where the cylinders are rather large for the work to be done when the engines are worked in the ordinary way, there is no need, in order to produce a compound from the common type, to change both cylinders. One can remain and a larger one be added on the opposite side, leaving all parts of the link motion and valves the same as before. The exhaust of one cylinder must be conducted to the steam passage or steam chest of the other. This had better be done by passing the exhaust from the high pressure around the interior of the smoke arch in such a way as not to interfere with the cleaning of the tubes. This pipe will form a reservoir; which, if made of copper and of sufficient dimensions to allow the steam to pass from one cylinder to the other without difficulty, will be large enough to act as a satisfactory receiver, and that detail, so perplexing in marine work, will, in this case, require no further consideration. And, in addition, being made of a good conductor, it will absorb from the hot gases coming through the tubes a large amount of heat which would otherwise be wasted.

The simple changes needed in the cylinders and steam connections to produce the compound from the common type of locomotive are neither difficult to make nor to decide upon, but those required in the valve gear to produce the best results do require, while inexpensive to make, much consideration with reference to the service to be required of the engine. It is true, however, that good results will be obtained if little or no change is made in the valve gear when changing to double expansion; yet if the maximum saving is desired, the valve gear must be well considered. If the locomotive is for fast express work, then the gear must be arranged to produce cards not unlike the one shown herewith; if, on the contrary, the engine is intended for switching or for slow freight, then the steam must be differently used to obtain the maximum power and efficiency. A consideration of the subject with reference to obtaining the best results leads almost directly to the conclusion that two reversing levers are necessary, but when the work for a given locomotive is nearly of a constant nature, there is probably little or no need for making the valve motions independent, even when the maximum economy is desired.

In taking up this question seriously, one will be confronted with a number of starting valves for the admission of high pressure steam to the low pressure cylinder when starting the trains. But happily this detail has a simple aspect when viewed from the side of the present American practice of starting trains with the throttle lever, the reverse lever being meanwhile in full gear. The problem came up on the German state railroads, where the cost of construction is carefully considered, even more so than in the United States. Labor is cheap there, but all that is possible of the money collected by the government is needed for the army, and they have none to spare for locomotives. It was settled thus: When trains are to be started the reverse lever is dropped "down in the corner," as it is called here, and in so doing an extension of the reach rod beyond the top arm of the reverse shaft is caused to push the handle of a small valve, and steam is admitted from the boiler direct to the low-pressure cylinder. This valve, having a small opening only, reduces the steam sufficiently in pressure to make the power of the large about the same as that of the small cylinder. As soon as the train is moving off at about three miles per hour, the reverse lever is hooked up about two notches, which closes the small valve just mentioned, and the engines are working compound. Thus, on the German roads the problem of starting trains is solved simply and easily. The engineer notices no difference in the number of motions required, whether he is working a compound or a single engine, and, what is more suggestive of simplicity, no additional handles are placed in the cab.

Having at hand a large amount of data relative to the performance of the compound locomotive, together with indicator cards taken therefrom and drawings of the same, it is to be regretted that more of the many interesting topics in connection with this subject could not be presented; but it may be that the drawings and illustrations which I have brought here to-day for the inspection of the members will offset the omission of further argument from this paper.

In reading over the foregoing, I find that in cutting down the paper I have eliminated a very important point; that is, with respect to the relative capacities of the high and low pressure cylinders. Various ratios of one cylinder to the other have been tried, varying from 2 to 1 to 3 to 1. A short conclusion drawn from the results of the trials may be stated, without departing from the truth, as follows:

First.—The capacity of the high-pressure cylinder compared with the low pressure cylinder should depend upon the character of the service for which the locomotive is intended.

Second.—In general, unless the low-pressure cylinder is greater than twice that of the high-pressure cylinder, changes will be demanded in the valve motion in order to gain the maximum economy and greatest efficiency.

Third.—If two reverse levers are used, thus rendering the cut-offs in each cylinder independent of the other, then the action of the locomotive in hauling trains, particularly at high speed, will not be unsatisfactory, even when the cylinder ratios are not such as to allow the maximum economy in service.

DISCUSSION.

Mr. CROSSMAN: I had invited several members (although I do not think I mentioned it on my postal cards) to prepare papers on this subject, and especially from one of our member, Mr. Hughes, Locomotive Engineer of the Northern railroads of India. He compounds all or nearly all of his engines, and I asked him to speak on the subject, but he was called away, and although this subject may possibly be disposed of at this meeting, I think it would be well to have it left open so that we may have the benefit of his paper next month.

Mr. Barnes explained some drawings of German compounds that were exhibited. This we omit as we shall shortly publish the drawings.

Mr. GIBBS: When a locomotive has two reverse levers on, one for high and for one for low pressure, is there not danger of having the work done by the locomotive very unequal? I see that difficulty.

Mr. BARNES: That is quite possible, but if there are not two levers there would also be the same danger. No disadvantage can result from the use of two reverse levers, even if an ignorant man is handling the engine, provided the levers be so arranged that the high-pressure cylinder lever is always moved backward. That is, the king pin upon the low pressure is hooked up, and the high pressure arranged so it can be used independently, and hooked up without changing the height for the low pressure cylinder.

Mr. RHODES: I would like to ask Mr. Barnes what is the minimum pressure at which it is considered economical to compound engines? If he has any data on that I would like to hear them.

Mr. BARNES: I think engineers believe, as a rule, it is no use to compound an engine where it can be used at the most economical cut-off, and at the same time expand the steam sufficiently to just blow the fires. That would correspond with the pressure in a locomotive of about 80 to 90 lbs.

Mr. GIBES: I would like to say a word on this subject, although I cannot offer anything very suggestive. These ideas have been in my mind ever since the subject of compounding locomotives was brought up to me. It is this: In the low-pressure condensing engines, one of the first reasons for compounding was found to be in the limited range of expansion which was possible. That range was limited for several reasons. One of the most important was that where you had too much expansion in low pressure the cylinder condensation was very heavy. In a condensing engine it is impossible to operate the valve gear to obtain much compression. Therefore you don't have the advantage which we have in link valve gears of restoring a portion, if not a very large portion, of the heat originally in the steam into the cylinder by compression at the end of the stroke. That really in effect increases the allowable ratio of expansion considerably, and in locomotives it is the reason why they are such economical steam users, the unequal service obtained from them. Now, in locomotives, we operate them with very much higher pressure than is possible in a marine compound condensing engine. Therefore, the initial condensation in cylinders, other things being equal, will be less. The terminal condensation will also be less; and when we are working at these high periods of expansion we are operating near the mid stroke, and compression is quite excessive, looking at it from one point of view. We know that condensation takes place as the water is evaporated, and the heat is supplied by the cylinder at the same temperature as the entering steam. Now in a locomotive the problem, it seems to me, is this: That to operate economically a compound engine we have got to have a sufficient ratio of expansion in each cylinder in order to derive the advantage of extra expansion. In starting out, a locomotive has to exert its heaviest power. Can we design a compound locomotive of such dimension of cylinder as will allow us to start and get under way a heavy train under our American practice, and after we have worked that train into speed, working on a level, will we not have to cut off too short to realize any economy from compounding? It is well established in compounding pumping engines, if you start in at low pressure, less than a certain pressure, which is about 50 pounds, you realize no advantage from compounding. In a locomotive, where we have to cut off so short to get excessive power, or wire-draw steam, how can we get economical pressure in a low-pressure engine? It seems to me that is a serious difficulty, and that it is the principal stumbling block in the way of compounding. At the same time these disadvantages may be entirely imaginary. But still they occur to me without looking at the question further.

Mr. BARNES: I think the point of Mr. Gibbs' question is whether in a locomotive, designed to start a train readily, that is a compound locomotive, the cut-off at high speed will not be too early to work with economy. If it were a slow-moving engine this would undoubtedly be the case, as far as can be seen, particularly if the valve gear was an ordinary cut-off, like the Corliss; but with a Stephenson link motion the wire-drawing at high speed is so great that the steam being wire-drawn is super-heated, and an earlier cut-off is permissible by reason of the super-heat than would be admissible if the wire-drawing did not take place. Some experiments made not long ago with super-heated steam showed the economy increased as long as the heat was maintained properly, until the cut-off was reduced to about eight per cent., which is below any cut-off we would get in locomotive practice. In starting trains with a compound engine the large size of the low-pressure cylinder assists materially, and during the first revolution the large cylinder does the greatest part of the work. After that the cylinders perform about equal amounts of work. It might be argued that there was some disadvantage in throwing the work during the first short advance of the train into the large pressure cylinder, but certainly it cannot be that great disadvantage will result from the use of the locomotive one-sided for such a short time.

Mr. GIBBS: I would like to ask whether the engine is found to ride as smoothly as a simple engine does? I think the more we look at the link motion the more we will be struck with the coincidence of excessive compression with high speed. It reduces after pressure, and still it might not be part of the original working of the engine.

Mr. BARNES: An answer to that question will not be satisfactory unless it could be made from the standpoint of the American engine. No complaints are made from those railroads which are using compounds, and I have myself ridden on three or four such engines at different times at a very high speed making such trips. One of them was the "Flying Scotchman," from New Castle to Edinburgh, which I went over this year at a speed of 65 to 67 miles an hour, as near as we could determine, and the engine rode very well. If there was any difficulty at all it resulted from the use of the heavy rock ballast and bad pounding of the joints, not from the action of the steam in the cylinders.

The PRESIDENT: I would like to ask Mr. Barnes if he can inform the members what is the relative first cost of a compound locomotive, and the relative cost of keeping them in repair, and the economy in the use of fuel in Europe as compared with the simple engine.

Mr. BARNES: The first cost of the compound is necessarily a little greater. There is the cost of a larger cylinder; it weighs more, and it must be more carefully constructed. The pistons have to be made lighter. They are made of cast steel and very thin in order to reduce the weight of reciprocating parts. The piston rods, by reason of the piston being larger, and probably having at some time stood very near the boiler pressure, are larger in diameter, in order to reduce the weight of the reciprocating parts so as to make those on the low-pressure side of the engine the same as those on the high-pressure side, and each part has to be made as light as possible. The connecting rod is made in a T section, which is an additional expense, but a necessary one. Then, in order to gain the advantages of a receiver which can super-heat the steam, the pipe of which it is built has to be of special form and made of copper, being a good conductor. Formerly there was another great expense in the production and arrangement of a suitable admission valve to admit steam from the boiler directly to the low-pressure cylinder. But in the device I have shown here to-day the cost is hardly worth considering. In maintaining the engine no satisfactory account has been kept of the cost of maintenance; however, it is true, without

doubt, that the admission valve of the more complicated forms has cost considerable to maintain. While the economy of the engine has been stated as high as 24 per cent., 15 being the lowest that I am aware of, it would seem that such an increase in economy would more than offset the increased cost of maintenance. Beyer, Peacock & Co., of Manchester, locomotive builders, are recommending them for all purposes, having instituted some experiments on their own account. They have a compound design of their own.

The PRESIDENT: On our American locomotives we have much wear of tire, from what is called the imperceptible slip. I would like to ask Mr. Barnes if he learned anything of the relative wear of tire in compound and simple engines as to slippage, or whether the fact of compounding has any influence on slipping engines on the surface?

Mr. BARNES: As the compound engine has more power at high speed it is probable the tire will wear more, because you will do more work. It is claimed by railroad men that tires slip quite as much at high speed as low speed. Whether this be true or not, I don't know. But if it is so, an increase of cylinder power at high speed would produce a greater slipping of the wheel. No records have been kept that I am aware of showing the comparative amount of tire wear in compound and simple engines.

Mr. GIBBS: I think there should be an advantage in that respect on the part of the compound for this reason, that the effort of the crank gear of the compound engine is more uniform than on a simple engine. In this way the turning moment is more uniform on the tire, and if the tire is properly designed so as not to slip, you have equal power by having low pressure with greater power to the stroke than with a simple engine. I think there is less tendency with the compound than with the simple.

Mr. BARNES: I think Mr. Gibbs' point is very well taken.

The PRESIDENT: You mean to say that the motion of the compound is more uniform during the revolution?

Mr. BARNES: Yes, sir.

The PRESIDENT: I think that must necessarily follow, and that would cure that part of the perceptible slip.

The PRESIDENT: When the subject of discussing compound locomotives was brought to my notice it occurred to me that it would be a good idea to write to Mr. Ely, of the Pennsylvania, and I did so, asking if he had any information on the subject to give us, and he writes, under date of Oct. 9: "We have had no experience with compound locomotives, with the exception of one three-cylindered compound locomotive, built for us in England. So far as we have used this locomotive there is an apparent economy in the fuel, but our trials have not yet been completed, and any information we could now give would not be very reliable. I see no reason why a properly constructed compound locomotive would not be economical in service."

Mr. BARNES: I move the discussion be deferred, and another paper taken up.

The PRESIDENT: Wouldn't it be well to continue this subject, as we expect Mr. Hughes, of the India railways, to be here at the next meeting? I think it very important, and it would be wise to continue the discussion at the next meeting.

Mr. BARNES: Mr. President, I would like to amend my motion in view of some information which seems to be quite valuable, which may be presented by Mr. Hughes at the next meeting, to read that the subject be continued until the next meeting. (Carried.)

The Eberhardt Drill Press.

This is a geared power press, possessing all the ordinary features of tools of this general character, together with some special details, which are added for the purpose of increasing its range and efficiency. Fig. 1 shows the drill with a tapping attachment and compound traverse table, the head carrying the tap being placed by the side of the main spindle. The tap-head has an automatic device, so that, by proper adjustment, the tap will enter the work to the proper depth, then reverse and be withdrawn ready for the next hole. The compound table, held parallel to the face of the column by two dowel pins at the ends of the raising and lowering rack, is composed of two slides moving at right angles to each other, the top slide having a rack and pinion, permitting quick adjustment. Ordinary taps are used, and no change of speed is required for tapping holes of different diameters up to 1¼ in.

Each form of drill press has a lever for shifting into back gear instantaneously. The automatic tapping attachment is also applied to drill presses with the ordinary round table, non-adjustable except for height; this arrangement being cheaper and equally suitable for some classes of work. The regular drill press is made as desired, with non-adjustable round table, sliding table adjustable in one direction, or compound traverse chuck. The latter form is illustrated in fig. 2, the top slide being 16 in. square, with a movement of 12 in., and the lower slide moving 18 in., at right angles to the top slide. The slots in the upper slide are not cut through for the whole length, but are tied by ribs at the ends, as shown in the illustration. This arrangement is novel, and is considered very desirable by the makers. There is a 2-in groove around the slots, to hold oil and chips. This adjustable table or chuck largely increases the usefulness of the drill press, permitting its substitution, in many cases, for a profiling machine.

The feed motion of the spindles in these drill presses is independent and reversible by power, and is made convenient for use by being indexed. Figures are placed on each cone pulley, showing which one should be used for a certain size of drill. Other novel points of the construction are the arrangements for taking up wear in the head and spindle, the means provided for raising and lowering the head by power, and the attachment of a bolt rack, permitting the systematic arrangement of all the bolts used about the machine. The makers, Messrs. Gould & Eberhardt, Newark, N. J., state that they have reason to believe that their innovations in construction are appreciated by mechanical men, judging from the many orders received.

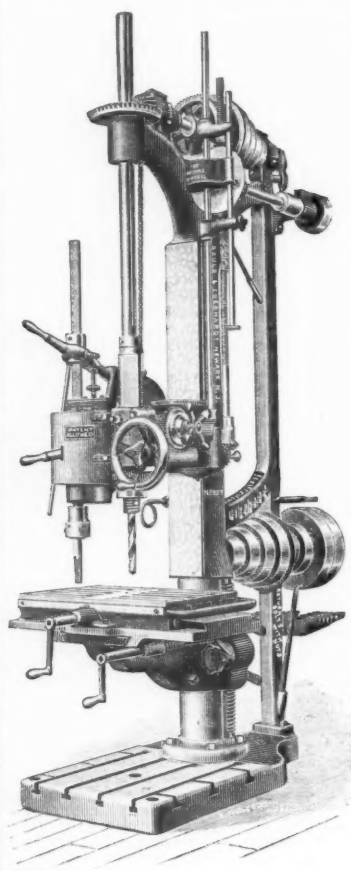


Fig. 1.

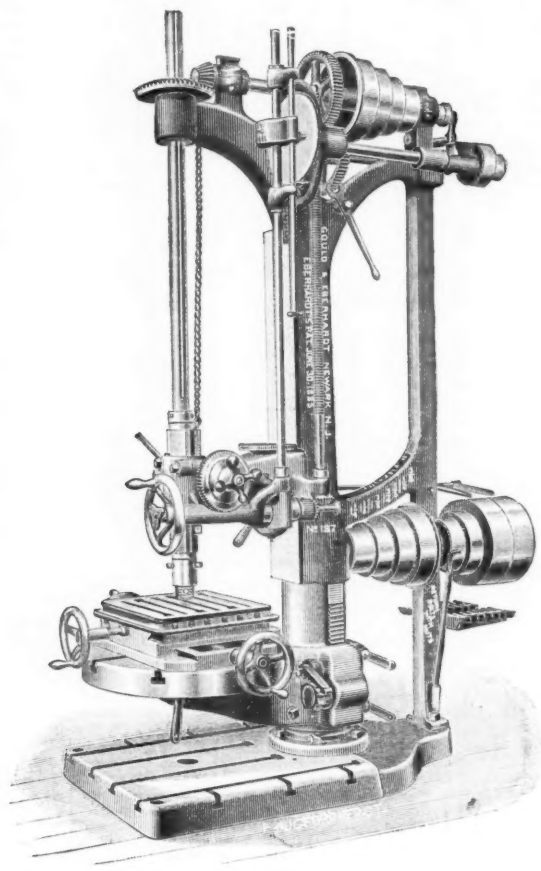


Fig. 2.

THE EBERHARDT DRILL PRESS.

Made by Messrs. GOULD & EBERHARDT, *Newark, N. J.*

Metal for Brake Shoes—Western Railway Club.

At the meeting of the Western Railway Club, Oct. 15, Mr. W. D. Sargent, Congdon Brake Shoe Co., read the following paper:

In considering the best metal for brake shoes, we should first of all insist that whatever metal is used, it be uniform in each shoe and of such structure as will not be tempered by the heat generated by friction. The same air pressure throughout a train of cars on which shoes of different hardness are used will cause a widely different friction on the wheels of the different cars. It is then impossible to obtain the maximum braking power for hard shoes without sliding those wheels to which soft shoes are applied. It is certainly profitable to fix upon a standard mixture for the foundryman to use when making cast-iron brake shoes; and it is by no means an unimportant matter to any railroad company.

Brakeshoes are made for three kinds of service, on chilled wheels, on steel-tired driver wheels and on steel-tired coach wheels. Those designed for the first-mentioned service are almost always made of cast iron, or cast iron with wrought-iron pieces in the face, or cast iron with chilled sections. Formerly anything that could be called a casting and attached to a brake head was acceptable, but of late more attention has been paid to the metal used. When cast iron is used a strong, tough metal soft enough to grip the wheels is economical, although its first cost is greater than a burnt grate-bar scrap mixture. A mixed of No. 2 foundry car wheels and heavy cast scrap has given good results. The combination cast and wrought iron shoe is much more durable than the plain shoe, and more desirable in respect to uniformity, because the same amount of wrought iron, forming one-half the surface of each shoe, will be nearly of the same hardness. These shoes must, however, be well made, preferably using merchant bar iron sheared in dove-tail pieces of the proper size.

On steel-tired driving wheels the Ross form of shoe is very extensively used, and is made of cast iron with crucible cast steel pieces imbedded, known as the Ross-Meehan shoe and of solid cast steel. The prime requisites in this style of shoe are that the tire wear produced by the shoe keeps pace with the wear caused by the rail; that the metal be uniform and remain so until the shoe is worn out; that the friction be sufficient and uniform, and that the shoes be durable. When two surfaces rub together the harder will abrade the softer, and the latter wear away quicker, but we are limited in the hardness of the shoes by the co-efficient of friction necessary. They must be hard enough to dress the tire, without the case-hardening of spots which will score it, but soft enough to afford the friction necessary to make stops. It is evident that for the different classes of engines different kinds of shoes will be required. The suburban passenger engine, making frequent stops, should be equipped with shoes less hard than applied on a through passenger engine. The combination cast iron and steel shoe has the advantage that the proportion of each metal may be varied to suit the requirements of the service.

Brake shoes for steel-tired coach wheels are applied under entirely different conditions. They are made either plain or flanged. The plain cast shoe should be soft and tough. Whatever kind of metal is used in the flange coach shoe, care should be taken that the shoe is a good fit to the tire and so hung that the flange grooves in the shoes are directly opposite to the wheel flange, and above all that the brake beam be free to move laterally as the wheel and axle move. Experiments have proved that a brake beam hung rigidly from the truck, in combination with the flange brake shoes, forms a grinding machine capable of turning a V-shaped flange, and that even with the plain shoe lateral motion is of decided advantage in protecting the flange. It cannot be learned that any device has been used purposely to effect that lateral motion with the exception of the one the Pullman Co. is now trying, consisting of a universal joint hanger constructed in a simple manner, although many brake beams do have some lateral swing.

The subject of friction developed, durability and other features of the different kinds of shoes are being investigated by several members of the club, whose tests, it is hoped, will do much to throw light on this matter, and to establish standards for the different conditions under which brake shoes are applied.

It might be interesting to know the consumption of brake shoes. On one line, having over 750 locomotives, about 600 passenger cars and about 23,000 freight cars, they used in the year 1888, 1,299 locomotive shoes, weighing 79,239 lbs., and 45,985 car shoes, weighing 965,685 lbs.; a total of 47,284 shoes, having a total weight of 1,044,924 lbs.; the car shoes used being mostly the Congdon shoe and equivalent to a much greater weight in plain cast iron, and the locomotive brakes were used merely in cases of emergency.

Mr. SCHROYER: Since our last meeting I have made some experiments to test the different metals which we have been using, to demonstrate if possible which was the best; but owing to a pressure of business, I have been unable to complete my experiments. As far as I have gone, I have learned just enough to know that I don't know very much about it. Mr. Thomson and I have devised an apparatus for testing the friction of our brake shoes. We have tested only two shoes, measuring the power applied and the friction in pounds, but inasmuch as our experiments are only partially completed, I do not feel that I should say anything in that direction.

Mr. RHODES: I am glad to hear that Mr. Schroyer has realized that the subject of brake shoes ought to receive very careful attention—more careful attention than we have given it heretofore—and that his road has taken it up. He is doing something which the brake companies a few years ago, when they came to make some trial tests, neglected entirely. They did not give the attention that they should to the brake shoe, and as a result, when we wanted to see which trains would make the shortest stops, it was found that the excuse was put on the shoes in a good many cases, and not on the brake gear; that was considered all right, but they would say that the shoes were not what they ought to have been. In most of the cases, it was found that the ordinary common iron had been used in the brake shoes, and after going through the numerous tests, it was found that many of the shoes had hardly any bearing against the wheel. Some of the shoes were almost white iron on the surface, and lumpy, and the lumps did not even wear off during the tests. It was considered such a neglect on the part of the companies wishing to show off goods which would stop trains in the shortest possible time, that the Master Car-Builders' Brake Committee thought proper to photograph the shoes, and publish the pictures in the annual report. I think it would be interesting for the members of the club to look back to this brake test and examine the brake shoes. When we talk about the importance of getting quick action brakes, and making short stops, the question is, have we given our brake shoes the attention that Mr. Schroyer says he is giving his? Here are some shoes (indicating pictures in M. C. B. report referred to) where the shoes barely got in service at all, and where they did rub, it is a hard white metal that produced very little friction—so the brake companies claimed. Here is another case where the shoes were made of soft gray cast iron. It is wheel metal, not the ordinary cast iron from which castings for cars are made. These have a black bearing. They had a full bearing. I think if we investigate the matter a little at the present day and look at the thousands of cars that are being made throughout the country, we shall find that they are putting in a shoe that the brake companies did not want at our brake test. What I think unfortunate in this shoe question is, that we have made no sufficient tests. First, we must consider the wear and then the friction that the shoe will give in making the stop. That subject has been named by the Master Car-Builders to be reported on at the next annual meeting, and I hope that we shall get a great deal more information on the subject of brake-shoes than we have heretofore had; and the first point for us to consider is how shall we make these tests in order to get this information? Would it not be a good plan to make the tests a little public, publish what the tests are going to be, and invite men who are interested in the shoe question to criticise these proposed tests, so that points may not be neglected which it is desirable to bring out. On the C., B. & Q. road we are much interested in this matter, too, and do not feel that we have

given it quite so much attention as we might have given it; and I, for one, would be very glad to join in with any tests which may be made, and contribute what I can toward the success of such tests. There is one thing to be considered, which I think of considerable importance in making these tests; we must not overlook the fact of the retarding power of the different shoes. When we make a test with an ordinary car, the friction of the journal may be different in one case than it is when we make the trip the next day, and we may possibly attribute the advantage one shoe gives, or one metal, to something inherent in that metal, where it may be simply because the journal resistance was different on the different days. Therefore, in making such tests, the journals should be so arranged that the journal resistance would be the same in every case. Mr. Verbryck has on the Rock Island road some cars fitted up with the roller bearings, which would make a capital test. The friction would be the same, and the chances are that cars so fitted up would be very useful in making a comparison between the retarding power of different kinds of shoes, because the tests would not be influenced by friction.

Mr. A. J. SARGENT: Inasmuch as I have been in the brake shoe business for fourteen years, I would like to say a word or two. I am really unable to determine what is the best metal We found in various tests that it was very important to have uniformity; but it is just as Mr. Rhodes said, we may have uniformity, but there may be different conditions that we, as manufacturers, may not know of at all. We may make the very best shoe for one road, and it may be entirely different on another road. We have been for some time striving to make our shoes uniform, and we also keep strict record of the mixture, so that if we get a shoe that was very satisfactory last year, we can turn back and find the mixture it was made of.

Mr. GIBBS: I would like to ask Mr. Sargent a little more fully his theory of the compound brake shoe, cast-iron shoe with wrought-iron pieces, and to explain a little more fully the meaning of his sentence referring to the compound shoe.

Mr. W. D. SARGENT: We have used what is called the Meehan T. The amount of steel is about one-third of the face, but we can vary it. We can make the back of cast-iron, and let the cast iron pass through the steel plate, and making it dove-tailed, hold the steel, making an economical shoe. That can be varied in construction to suit the requirements.

Mr. VERBRYCK: I have never made any particular experiments with brake shoes. We have been using the Congdon brake shoe on our freights for a good many years. That is a cast iron shoe with pieces dove-tailed in. And we have used on our steel-tired wheels Mr. Sargent's Ross-Meehan shoe. We have never made any particular tests, so that I cannot give much of an account of what they have been doing. I know very well that a shoe made the same as the Congdon shoe will outwear the plain cast iron shoe three or four times. I am satisfied as far as that is concerned, but I have never made any scientific tests.

Mr. SCHROYER: One time on our road the adjustment was 15, 35 and 31½, 13, on the brake cylinder levers. Those two adjustments were considered ample to meet the requirements of all the cars in our passenger service. We found that a great many of those cars would have one of the holes properly adjusted for the weight of the car, while another car would be three, or four, or five thousand pounds out of the way in the adjustment. The result of that was that those cars would go into service and be made up into trains and many portions would be working below capacity. The engineer could not stop his train, and he would lose his air, and those cars that were working up to their capacity would have slid wheels as the result. We went over that very carefully, because we then considered that that was where the difficulty lay, and we are now adjusting our cylinder levers according to the weight of the car, working each car to its full capacity. When we now find a slid wheel, the result of our investigations is that we find a soft shoe on that brake beam, and we are having a slid wheel as the result of the greater cohesion between the two. The same results happen now, only we attribute it to a different cause. We have experimented with three different brake shoes. When we have found it necessary for any reason to take off one shoe, all the shoes have been taken off, and we have found that shoes would vary greatly in weight. One of the shoes would be worn entirely away, while the shoe on the same brake beam would not have lost more than 10 per cent. of its metal. At one time we used nothing but the Congdon, but we found that they would cut away our steel tires, and now we are using nothing but plain cast-iron shoes on steel tires. We have now fitted up a special apparatus to put in one of our grinding machines for the tests I spoke of, and while I did not think I would give any figures, I believe the figures we have on the two shoes tested to be accurate. We had those shoes cast, two of three different kinds, but our pattern-maker did not thoroughly understand the object of having them cast, and the result is they were all cast with about the same metal. We have made a wrought-iron shoe and a cast-iron shoe, and I will give you the results of our experiments. In a cast-iron shoe that we tried, we had 6 sq. in. of bearing surface. Originally we had twelve, but we cut it down. Under a pressure applied to the shoe of 75 lbs. in 6 sq. in., we had a frictional contact of 40 lbs., the co-efficient of which is .533. With the same shoe under a pressure of 175 lbs., there was a frictional resistance of 60 lbs.; pressure 260 lbs., frictional resistance 90; pressure 350, frictional resistance 120; pressure 340, frictional resistance 140. The frictional resistance is increasing, not in proportion to the power applied, but the co-efficient is getting less. Then we increased the pressure applied to 525 lbs., and we had a frictional resistance of 110, or 30 lbs. less than we had when we applied 430 lbs. The only cause to which I could attribute that was the fact that particles of metal would work in between the shoe and the wheel, and necessarily reduce the friction between the two, and after that worked out, and then the frictional resistance would commence to increase again. Under pressure of 660 lbs., frictional resistance 105; 700 lbs. pressure, resistance 120; 990 lbs. pressure, resistance 135; 880 lbs. pressure, resistance 145; which gives us a co-efficient to the powers applied of 343, 344, 342, 325, 209, 172, 171, 183 and 168. Now the wrought-iron shoe acted entirely different. The co-efficient with the wrought-iron shoe, when the application was first made was very much less than the cast-iron shoe, but as the wrought-iron shoe commenced to get warm and soft, it took a greater hold on the wheel than the cast-iron shoe would, and in the case of the Congdon shoe it gets heated, and as it is released it crystallizes and your wheel tightens. That is as far as we have gone with our experiments, and we have learned just enough to be aware that we know but little about it.

Mr. COOK: We have been using the Congdon brake shoe on our cars, and have used them for a good while. We have made some tests which satisfied us they were the best shoe and produced the best result as regards stopping, and that they would last much longer, and since we have been using the Ross-Meehan shoe we have found that it cuts off the tires where we want to get rid of the metal. It keeps our tires in better shape, and we find we do not have to take our engines into the shop so often to turn the tire.

Mr. GIBBS: Mr. Schroyer has shown very conclusively the direction in which modern practice tends in braking; that is, the use of the highest allowable braking ratio. He speaks of 90 per cent. I presume he speaks of passenger service, and we have used the same, which should make us keep before us the very slight margin we have. We cannot know too accurately what the co efficient of the fraction between the shoe and the wheel depends upon and what influence the metal has upon the co-efficient, and when we have once got it we must keep it uniform in order to avoid sliding wheels.

Mr. SCHROYER: Let me say as regards my explanation of the co-efficients that the figures should be decimal. As to the metal of the shoe, it will be necessary to increase the bearing surface to avoid the amount of labor used in the replacement of the shoe.

MR. RHODES: I have always tried the plain shoe or soft cast-iron. Many different shoes, however, are being introduced, and I hope that some of the advocates of these different shoes will endeavor to bring out their arguments in favor of them, if not now, at some time before tests and investigations are made, and I would like to call attention to one matter to illustrate what I want to get at. We will suppose that I have a round wooden bar in my hand, and I hold it tight. A man less strong than I am tries to turn it in my hand. I hold it tight and he cannot turn it. He has less strength than I have and I hold it. Now, suppose he says, "here, dip your hand in some oil and I can turn it," and he turns it. Now I have exactly the same strength as I had before. Now the reason is that the frictional resistance is less than it was Now, in place of using oil to change this, suppose I use a different material, and use a material that has different frictional resistance, what is the result? The bar is going to turn in my hand very readily and my hand is not going to wear away. It is going to last much longer. I am using the same strength. I have the same power to hold it as I had before, and it seems to me that when we get right down to this shoe question we will admit we have some arguments that where the shoe lasts longer than a plain shoe there is not so much frictional resistance there, and that a careful test will show that there is not the same retarding power if the shoe lasts so much longer. Now I may be asked, "Well, do you disapprove, then, of these shoes that are being introduced, such as the Ross-Meehan shoe and other kinds of flange shoes; do you think that is a mistake?" I say "no, not at all;" it is decidedly good to do that, and why? Because you are putting the pressure on the parts that do not wear very much, and we are putting it on the flange and on the outside of the rim of the wheel where you can afford to wear it away. If you put it on the wearing portion I think very soon that people using it would stop, but if it is put on the flange and outer rim which we have to turn away, that is an advantage.

The PRESIDENT: I notice that Mr. Kidder, representing the Westinghouse air brake, is in the hall, and I have no doubt he has had some experience in that, and I would like to hear from him if he has any information upon the subject.

Mr. KIDDER: I do not know that I can talk, because I have got a very severe cold; but in regard to the wear of the soft as compared with the hard brake shoes, I have had a little opportunity to observe something of the kind. A little over a year ago we equipped a couple of trains with soft brake shoes, and these trains ran for some months and gave most satisfactory results; but finally there was a complaint put in on the part of the engineers that the brakes didn't seem to hold as well as formerly. I investigated as well as I could, and found that it was the same as when we originally equipped the train, but on looking into the matter a little more thoroughly, we found that they had been gradually substituting cast-iron in place of the soft shoe, and they had gradually put these shoes on, and, as a consequence, the braking power had deteriorated.

Mr. LITTLE: If you will allow me I will read a little report to show what a compound shoe will do, without mentioning the road it is on. Total number of shoes used from Aug. 1 to July 31, 3,761; total number of cars in daily service, 380; total number of shoes used per car, 10. The average life for each shoe, 290 days. I am very glad to have Mr. Schroyer bring up the subject as he has. In going about the country I have found gentlemen not very anxious about looking up brake shoes. They simply say when a brake shoe is worn out we put on another; but I am very glad that Mr. Schroyer and Mr. Rhodes are going into these tests, because it will help us as much as anyone else, and probably more than it will the railroads. We have never had a cut tire. No kind of tire we have put our shoes on has ever been cut that we know of. I find by questioning the engineers that they get just as much friction as they need, and have no complaint to make in regard to loss of braking power.

William H. Cilley.

It is a painful duty to chronicle the death of William H. Cilley, late General Manager of the Oroya Railroad, Peru, of which he was the superintendent during construction, and who for twenty-seven years had been prominently connected with the railroad development of South America. Few men on the West coast were more widely known, and no one was more thoroughly respected or more universally esteemed.

Born in Northfield, N. H., on the 26th day of May, 1839, of a distinguished New England family, he inherited principles of rigid integrity, decision of character, firmness of purpose and reliability that shone conspicuously throughout his whole life.

At a comparatively early age he felt the need of active usefulness, which seems innate in the sons of his native state, and gained his first experience in railroading on one of the railroads of New Hampshire. Here he successively occupied every post, from fireman, engineer and roadmaster to chief of traffic. Endowed with a retentive memory, and giving an earnest, patient attention to detail, he made himself master of the art of railroading at that time. Turning his attention to gas engineering, he entered the service of the Boston Gas Works, and before long rose to the position of manager.

Attracted by the opportunities presented in the new fields of the West, he engaged successfully in mining in California, and it was here that he first met Henry Meiggs, in whose gigantic railroad works in South America he was later to play so prominent a part. Having thoroughly acquainted himself with the mining operations of California, and acquired a modest fortune, he returned to Boston, where, however, some unfortunate investments caused him serious losses.

It was about this time (1862) that Mr. Meiggs, having contracted to build the railroad from Quillota to Santiago, the capital of Chili (the comparatively short link from Quillota to Valparaiso being already completed), wrote to Mr. Cilley, urging him to join him in the work. The contract called for the completion of the road in three years, with a bonus of $10,000 per month for its earlier delivery, and a like penalty for delay. Ground was broken on the 18th of September, 1862, and, thanks to the wise and energetic management of Mr. Meiggs and Mr. Cilley, the first through train went over the road, connecting the capital and the port, on the 18th of September, 1864.

Here it was that the writer, who was Auditor of the road, first knew Mr. Cilley, and even before knowing him personally was attracted by the exceptional clearness and absolute accuracy of the accounts turned in from the division under his charge. They were simply faultless, and this care and attention to details was a marked feature of his career. A friendship soon sprung up between the writer and Mr. Cilley, which has lasted unbroken for a quarter of a century, and has prompted this tribute to the memory of a man who possessed all the sterling qualities that win for their possessor the love and confidence of his fellows.

Mr. Meiggs, having finished the Valparaiso line, and extended the Southern line to San Fernando, was invited by Col. Balta, President of Peru, to undertake the building of the railroad system of that Republic, including the famous Arequipa & Oroya railroad, whose daring engineering is unparalleled in the history of railroad achievements. Early in the undertaking of the difficult work of the Oroya, various superintendents of construction having failed to show that skill and energy in plan and execution demanded by so exceptional a work, Mr. Cilley was summoned from a less important line in the North and given absolute control. He thus again became the lieutenant of Mr. Meiggs, who attracted to him the best engineering skill of America to aid him in the almost insuperable task of building the Andean railroads.

In the location of the mountain divisions of this wonderful road Mr. Cilley, as Superintendent of construction, was ably seconded by a corps of young and enthusiastic engineers, such as Briggs, now Chief Engineer of the Denver & Rio Grande; Bogue, Chief Engineer of the Union Pacific; Van Brocklin, the first General Superintendent of the Sixth Avenue Elevated road, of New York, and others of like prominence, whose graduation from the severely exacting school of the Oroya fitted them for the eminence in their profession they have since attained. The location once decided upon, Mr. Cilley marshaled his little army of railroaders to the execution of the work, and the story of the result is bewn in imperishable letters of granite in the rugged defiles and on the lofty slopes of the Cordillera, where at a height of 15,600 ft. the highest tunnel in the world, nearly 4,000 ft. in length, pierces the summit.

Consistent in his belief in the efficacy of "the eye of the master," Cilley was always on the work himself; strict in his discipline, he allowed no defective work or material to escape his scrutiny, and largely due to this strict surveillance of the operations of his subordinates is the fact that, although the line—a constant succession of curves for a length of 50 miles—has an average grade of 3½ per cent. for that entire distance, and may be, therefore, considered exceptionally liable to accident, no passenger has ever lost his life during the 18 years it has been in operation.

On the completion of the road to its present terminus he was appointed manager, and, during all the difficult and delicate situations presented by the financial crisis of 1877, followed by the disastrous war with Chili, a year or two later, his firmness, his sense of justice and his tact saved the interests entrusted to him, when men of less integrity or courage would have been overwhelmed. The peculiar relations consequent upon a state of war, and at times of revolution, made his position as manager of the most important railroad in the country—strategically and otherwise—one of exceptional delicacy, requiring the exercise of diplomatic tact, of instant decision and unhesitating execution. He never hesitated or temporized. Living, as he has, half a lifetime in Chili and Peru, he was thoroughly acquainted with the character of both peoples, and in both had many warm friends. Upon the occupation of Lima by the Chilian army in 1881, he was left in the undisturbed management of the road, while other lines in the path of the victorious army were seriously interfered with or destroyed.

Careful to steer clear of dangerous complications during the political disturbances he was not infrequently called on to witness, he avoided political compromises, while enjoying the confidence and esteem of men of all parties; and although the destruction of a single tunnel or bridge would at times have been of immense advantage to one or the other faction, the personal respect he universally commanded again and again saved the road from damage during the struggles for supremacy.

During the administration of Don Manuel Pardo, the far-sighted and patriotic statesman to whom the railroad system of Peru owes so much, he was anxious to ascertain from Mr. Meiggs the exact state of forwardness of each of the railroads then under contract, the amounts spent upon each, the condition of the accounts of the contractor with the government, and sundry other details. At the suggestion of Mr. Meiggs, Mr. Cilley was sent for. In an interview lasting some two hours, from memory, without notes or memoranda, he gave the President the required data, with such exact minuteness as to call forth the warmest expressions of satisfaction from His Excellency.

On the occasion of the terrible catastrophe of the burning of the church of the Campania in Santiago, Chili, on Dec. 8, 1862, he was one of the devoted band of Americans who

risked their lives in the effort to save some of the victims of that disaster, in which over two thousand women and children lost their lives.

In 1866, war having been declared between Spain and Chili, as the ally of Peru, the government of Chili asked Mr. Meiggs to recommend some one of ability and integrity to act as their confidential agent for the purchase of war material in the United States. Mr. Cilley was chosen for this delicate mission, and, making use of his own personal influence and credit, since the arms were only payable on delivery at destination, and the risk was great, he succeeded in buying and shipping the armament necessary, which makes the port of Valparaiso to-day almost impregnable, and prevents repetition of the sad spectacle of the bombardment of an unresisting commercial port, as witnessed by Mr. Cilley and the writer in April of that year.

His personal gifts were great. Few men could be more interesting in conversation, for he was a close student of books and of men. He impressed one as a man thoroughly acquainted with whatever subject he discussed. He was, withal, modest and self-forgetful to a degree, although his disdain of danger in any form amounted almost to recklessness. No one who has ever thundered down the grades of the Oroya on a hand car, with Mr. Cilley as his guide, can ever forget the cool audacity with which he would plunge into the depths of a yawning tunnel or whirl around the serpentine curves of that remarkable road, talking as easily and lightly the while, as though riding smoothly in a palace car on one of our own perfect railroads.

His associates loved him, his employés were devoted to him, for it can never be said that Mr. Cilley would ask a man to go where or do what he himself would be unwilling to attempt. The writer could fill a volume with personal reminiscences of deeds of daring done by him in the most natural manner, for they were in the line of duty, but will only mention one or two, which will sufficiently illustrate this prominent phase of his character. In the earlier days of his railroad experience, wishing to study the manufacture of nitroglycerine, he engaged himself as an employé in a large manufactory of this explosive. He was already theoretically well informed on the subject, but accepted a subordinate position, that he might know it in all its details. On one occasion, when the necessary proportions of nitric acid and glycerine had been mixed in one of the large tanks, he saw a dangerous chemical reaction beginning in the mixture. He was alone in the laboratory, and, although others were within call, instant action was demanded. While there might have been time to save his own life by flight, there was not enough to warn all in the building. He remained at his post, coolly opened a valve in the bottom of the tank and, although severely burned, waited until the last drop had escaped into the waters of the bay. Investigation showed that the nitric acid employed had been carelessly accepted as pure, while charged with impurities such as, had he not acted with instant promptness, must have resulted in a fatal explosion.

During the occasional bombardments of Callao, in the course of the Chili-Peruvian war, the opening gun was always the signal for him to board his special engine at Lima and hasten to the port, where he patrolled the station of the Oroya road, seeing that every man was on duty, and looking after the safety of the property of the company. On one of these occasions a 200-lb. shell plunged through the roof of the station, narrowly missing him, and, crashing through the door of the waiting room and the floor, exploded, tearing up some 30 ft. of the flooring and setting it on fire, while a second and third destroyed both tracks of the line near the entrance. Calling his men together, he soon extinguished the fire, relaid the broken rails, and, climbing to the roof of the building, sat down and watched the bombardment to its close.

During the same war, the port of Ancon, some 12 miles north of Lima, and connected with it by rail, was ordered by the blockading fleet to be closed. Three days were allowed in which to remove all neutral property, in anticipation of a bombardment. The recent loss of a Chilian cruiser by an artfully concealed torpedo had exasperated the blockaders, and a corvette was stationed off the port, while a guard boat, with a small breech-loading rifle in the bow, cruised near the mole, to see that their orders were obeyed. A large number of cars loaded with merchandise belonging to Lima merchants had been left on the tracks leading to the dock, the short time given being insufficient to allow of their removal. Mr. Cilley, however, resolved to make an effort to rescue them and their freight. He ingeniously arranged an engine to exhaust into the tender tank, so as to move as noiselessly as possible, blanketed the cab, and at dusk slowly backed down to the head of the train unperceived. Strolling down to the end of the dock, he saw the guard boat within hailing distance, her bow gun trained on the station. Returning leisurely to the train, he mounted the engine and gave the order to pull out. The gunboat opened fire on hearing the rattle of the departing cars, shell dropped to the right and left, several striking the train, but fortunately not exploding, and in a few minutes it swept around the curve and sped safely on to Lima.

His whole life was one of courageous devotion to duty. Generous and self-sacrificing to those in need of him, he was the most loyal of friends, the most faithful of custodians, and was never known to neglect a trust or evade a responsibility. Nor was it among his countrymen or co-workers alone that his worth was recognized during life, or his memory honored after his death. At the funeral ceremonies in Lima, on the 12th of September, the President, represented by his Aide, the Secretary of the Treasury and the President of the Senate, accompanied the Minister, the Secretary of Legation and the Consul of the United States as pall-bearers. Thousands of the people of Lima joined in showing their sorrow at what all felt to be a national loss. Flags drooped from their staffs in sign of mourning, a guard of cavalry represented the army, and the coffin was hidden from sight by a wealth of floral offerings, from the stately cross of the employés of the Oroya to the humble wreath of the unknown mourner his open hand has saved. And at the tomb, one of the most eloquent of the statesmen of Peru, Dr. Luciano B. Cisneros, in saying farewell to his friend of many years, paid a touching tribute to his life and character. We regret that space will not allow us to give the remarks of Dr. Cisneros in full, but must content ourselves with a few brief extracts. He said:

"Before consigning the precious remains of William H. Cilley to the obscurity of the tomb, let the friend whose hand was among the first grasped by him on reaching the hospitable shores of Peru be permitted to utter a few heartfelt words of farewell, in recognition of a sacred debt of the truest affection. * * * William H. Cilley was a worthy laborer in behalf of industry and peace. He came to Peru, not brought by the wave by which at times one is cast upon an unknown shore, to seek what the chances of destiny might give, but to lend the precious aid of his grand inspirations and of his initiative to the monumental works contracted for by Henry Meiggs. He came, therefore, bringing with him a noble profession, that inexhaustible capital, constantly renewed, which no vicissitudes of fortune can take away. He brought with him unquestioned probity and that wealth of sound liberal ideas and of severe morality inherited from his ancestors, which was the foundation of the well-deserved, honorable and universal confidence which made his name resplendent. He brought those gifts of daring intrepidity and feverish activity which, for certain enterprises, are the distinctive characteristics of his race. In a word, he came as a pure and precious element in the building up of national progress, thus symbolizing with wonderful perfection the ideal of the foreigner beloved and cherished by Peru; of the foreigner she needs, and without whom—let it be said frankly—the regeneration of our country would be impossible, since Providence has ordained that peoples be drawn closer together and perfected through such messengers of peace, destined to bestow the benefits of their precept and example, as teachers and helpers, upon civilizations less perfect. Hence is it to-day, when one so worthy has left us, that the mourning people make this grief their own. * * * We cannot recall these happy relations between our lamented friend and the society around him without remembering that they were greatly strengthened by the virtues of his noble character. There is nothing grander in the sight of God, nor more consoling to the heart of man, than acts of faith and charity. Cilley never forgot this priceless maxim, and to it he owed in the varied situations of life the pure satisfaction of drying many a tear and of rescuing many a precious life from hopeless misery. * * * The pilgrimage of Cilley through this world has, therefore, not been a barren one. He was not a great genius, meriting an epic, nor was he one of those innovators who transform the fate of nations or of men; he was far from being one of those men of profound talent who draw wonderful revelations from professional experiment or from the depths of science, but to us he was useful, and the useful man commands the respect of his fellows; he was a worker who practiced morality and virtue, and it is our duty to exalt these virtues, with out which national prosperity is impossible." C. S. R.

[Mr. Cilley's body was buried at his home in Leominster, Mass., on Wednesday of this week.—Editor Railroad Gazette.]

Western Railway Club Meeting.

The regular monthly meeting of the Western Railway Club was held Oct. 15, 1889, at their rooms in the Phœnix Building, Chicago, and was called to order at 2:30 p. m. by the President, Mr. John Hickey, who read the following paper:

In returning thanks for the honor conferred in selecting me to preside over your deliberations for the ensuing series of meetings, I am reminded of a few matters relating to our duties as members of the club, and the objects which prompted its formation.

The Western Railway Club was formed for the purpose of increasing the knowledge of its members and others concerning all matters relating to railroad rolling stock. At stated monthly meetings, its members interchange views of their experience in railroad work. All persons having in view the advancement of railroad interests are invited to become members and partake in these discussions. The friction of debate affords us an opportunity to profit by the experience of others, and the knowledge obtained is often of the highest value. The most valuable feature of our meetings are discussions; questions that elicit discussion in which all sides of a case are presented tend to induce conservatism in ideas, and plainly remind us that it is possible we may be pursuing a wrong policy without being aware of it. * * * We are led to investigate all matters of interest in our business not fully understood, and give the members the results of such investigation and the benefit of each other's experience. * * * If the causes which led to the formation of an association of railroad men for the objects and purposes just stated existed at the inception of this club, the necessity for such an organization at the present time has very much increased.

The recent restrictions placed upon railroads by the enactment of untimely laws give cause for serious thought in all matters pertaining to the roads; these, with competition and the reduction of rates, have made the greatest possible economy in the maintenance of equipment a necessity. * * * To assist in saving the wreakage thus wrought has become one of the highest duties of persons in charge of railway departments, and demands careful and united action in the application of remedies. In the use of labor and material, the manufacture and maintenance of rolling stock, the greatest care must be exercised and the closest economy practiced. We must look for economy to result from greater durability of the machinery and its more perfect adaptability to the amount and kind of work to be done; in other words, greater perfection in proportions, and the use of the very best materials for the purpose, thus making the engine or car as near perfect as possible, and then getting the greatest mileage out of it that is practicable in a given time, so that a less amount of rolling stock may do the work. It is cheaper to make 70,000 miles a year with one engine than to use two in making it. The cost per engine mile under ordinary conditions will be no greater when making 7,000 miles per month, than if the engine makes but one-half this number of miles. Aside from the time required to give the engine necessary attention, it would be cheaper, perhaps, as regards cost per mile, to run it continually until worn so as to necessitate going into shop for repairs. The adoption of a general plan by which can be established a higher standard of education for men engaged in engine service is a subject deserving the most serious consideration. By this means is laid a foundation from which must spring habits of a higher order. * * * Greater durability of parts, uniformity in design, a less percentage of dead weight to paying load, a less number and more easily solved code of rules governing interchange, and a mechanical arrangement of parts that will insure freedom from derailments, while offering the greatest possible safety to life, are elements in car service requiring prompt attention.

All members should encourage the presence at our meetings of others than the heads of mechanical departments. Those connected with transportation and track departments would be a valuable addition to our meetings.

The papers and discussions at this meeting are given elsewhere.

Open-Side Metal Planer.

The distinctive feature of this planing machine, made by Messrs. Detrick & Harvey, Baltimore, Maryland, is the use of a single standard for supporting the tool-beam, so that work of any width can be put upon the platen. Two views are presented of this apparatus, and will make the arrangement clear. It will be seen that the machine is strongly proportioned, and it may be added that approved methods of operation are employed, including the Sellers' spiral driving mechanism and the feeding device which is thrown out of gear except when feeding, and thus only consumes power when doing work. A supplemental rolling table is attached, as shown in one of the illustrations, to form an outer support for very wide pieces of work, or for long pieces whose ends are to be planed.

The tool-beam can be removed from the support, and the tool-head placed upon the saddle of the standard for vertical planing. In several sizes of the machine an extra head for vertical planing is furnished, with an independent feed-screw, so that the top and side of a piece of work can be planed simultaneously, if desired. The advantage of this arrangement, as recognized by practical men, is the possibility of finishing surfaces accurately at right angles to each other without the need of special adjustments. The machines are designed for large capacity, the tool-head having a travel of 30 in. across the platen in the smallest size planer and 10 ft. in the larger sizes. The reverse motion of the platen is four times as fast as the forward or planing motion.

The manufacturers state that a sufficient number of these machines have been operated to demonstate thoroughly their strength and efficiency, and claim that the open-side planer is "equal to the best two-post planer for the regular line of work," with a capacity for special work quite beyond the range of machines of ordinary design.

Influence of Temperature on the Mechanical Properties of Iron and Steel.

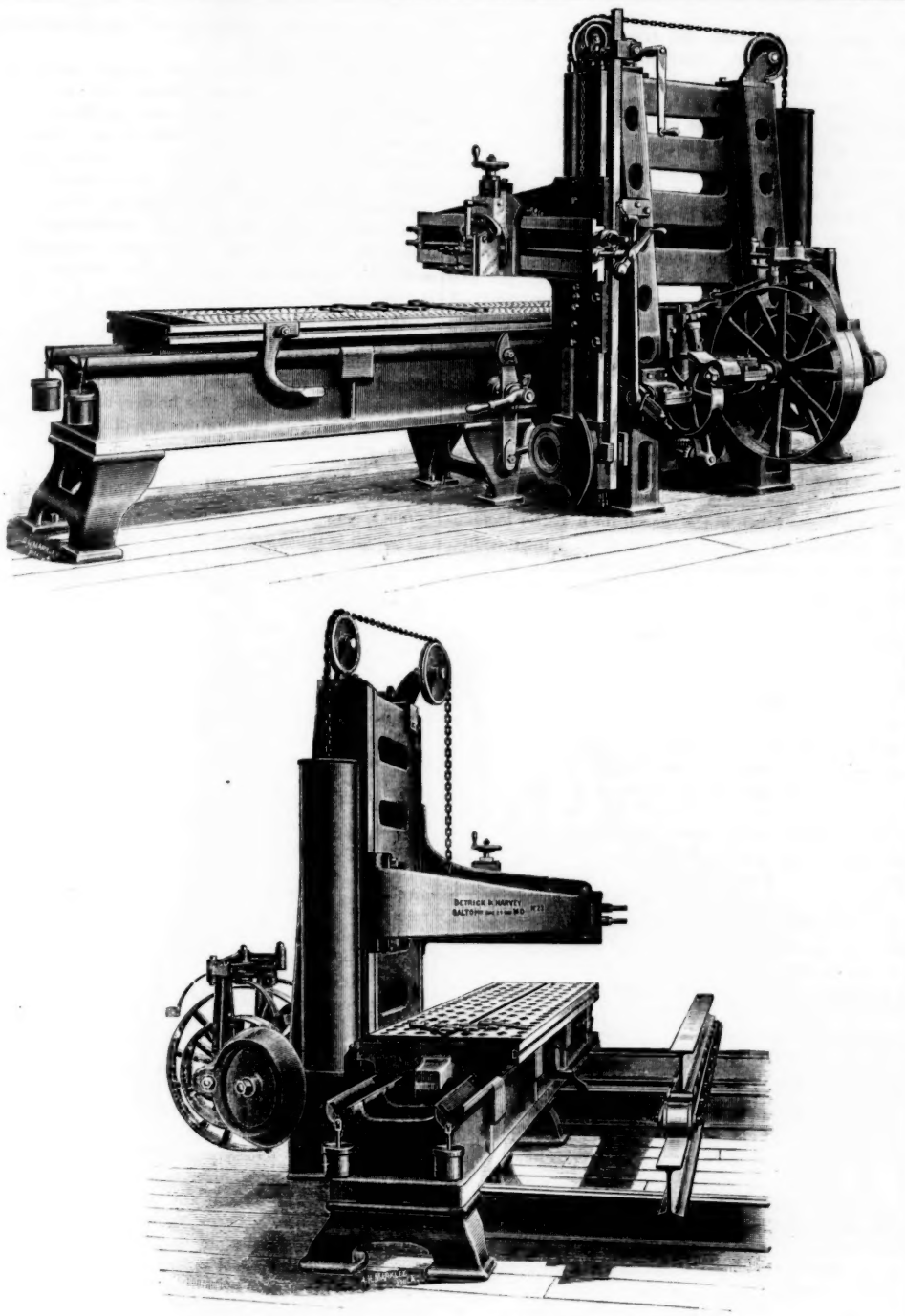
The following article, by M. André le Chatelier, is translated from the *Comptes Rendus*:

In studying the influence of temperature on the mechanical properties of iron and steel, I have only tested samples of cast metals. Puddled iron, tried in the state of fine wire, gives very irregular results, due to the impurities contained. The cast steel and iron used in these experiments were very pure; they contained from 0.35 to 0.40 per cent. of manganese, with variable traces of carbon, from 0.05 (cast iron) to 0.80 per cent. (steel of medium hardness). The experiments were made by applying the load at a uniform rate of 2,130 lbs. per square inch in a minute. The extensions were measured on a length of 5.9 in.

The results obtained show that steel and iron act differently from all other metals. In the variations of their mechanical properties with the temperature there are three phases to be noted:

First phase from 59 to 196 degrees, Fahrenheit.—The resistance to rupture decreases from 52,200 to 47,360 lbs. per square inch for the cast iron, and from 97,700 to 91,880 for the steel. The specimens break with considerable reduction of area. The elongation was 30 per cent. for the cast iron and 20 per cent. for the steel. Between these temperatures iron and steel obey the same laws as other metals.

Second phase from 212 to about 464 degrees.—In this phase iron and steel have peculiarities not shown by any other metal. The breaking load remains sensibly constant, about 49,780 lbs. per square inch (cast iron), and 92,450 (steel). The extension is much reduced. It ranges between 7 and 9 per cent. for the cast iron, and between 3 and 7 per cent. for steel. The most noticeable fact in this period is the following: The extension, instead of being continuous, as with other metals, takes place by jerks, so to speak, varying considerably in amount, which are separated by periods during which the slightest stretch cannot be perceived. These abrupt extensions are accompanied by cracking, the sound of which is quite loud at 302 degrees. The slightest jar produces this cracking sound. I have noticed these extensions by jerks in more than 200 tests, and I have found them at the same temperature in all the alloys of iron, even those containing only 2 or 3 per cent. The amount of carbon has a great influence upon the maximum elongations, which rarely exceed 2 per cent. for the cast iron, and for the steel can attain 6 per cent., or 0.35 in., for a wire 5.9 in. long. I have proved that the abrupt elongations of the steel are not local,



DETRICK & HARVEY'S OPEN-SIDE METAL PLANER.

but occur simultaneously over the whole length of the wire submitted to test.

Third phase, above 464 degrees.—At the commencement of this period the breaking load increases considerably; its value for cast iron is 62,870 lbs. per square inch, from 482 to 572 degrees, and for steel, 103,540 lbs. per square inch at 302 degrees and 107,950 at 572 degrees. The elongation increases and becomes about 20 per cent. at 572 degrees for both metals; rupture occurs with a slight reduction of section. The metal again obeys the laws of other metals; the elongation is continuous; the breaking loads increase above 572 degrees; the elongation by reheating begins to manifest itself at 662 degrees.

The periods of transition between the three phases are very short for the conditions under which the experiments were made, the passage from the first to the second phase being between 176 and 212 degrees; as to the third phase, at its commencement the elongations are at first discontinuous—a character of the second phase—and then become constant, indicating the passage to the third phase. But the initial temperatures of these phases are sensibly increased if the load is applied more rapidly. Thus, when the specimen is strained at the rate of 17,780 lbs. per square inch in a minute, the commencement of the second phase occurs at 248 degrees.

Producing the rupture by a series of blows, the second phrase for the cast iron does not commence below 392 degrees, with a zone of transition extending from 176 to 392 degrees; the third phase commences about 662 degrees. This explains the popular belief that iron and steel have a maximum tensile strength and brittleness at 572 degrees. They really are most brittle under blows at this temperature, but they also have the maximum tensile strength and ductility under loads gradually applied.

To conclude, two modifications are produced in the mechanical properties of cast iron and steel; one may be noted about 176 degrees, and the second at 464 degrees. These modifications depend both upon the temperature and the rate of applying the load, that is to say, upon the time of applying the strain and its amount. They must be due to the transformations caused by the simultaneous influence of the load and the temperature, being made pronounced as the temperature is raised and the metal subjected for a longer time to the action of the influencing causes.

These transformations are permanent, and are shown, after cooling, by a considerable increase of the elastic limit and breaking load, and by a noticeable diminution of elongation.

Among the many experiments of this kind which I have made, I will cite the following: Three wires of cast iron, 7.9 in. long, were loaded with 42,670 lbs. per square inch, at a temperature of 59 degrees, which caused an elongation of 9 per cent. In this condition they were heated, No. 1 to 165 degrees, No. 2 to 201 degrees, and No. 3 to 374 degrees, each for a period of ten minutes. After cooling they gave the following results:

Specimen.	Temperature.	Load, lbs., per sq. in.— Elastic Limit.	Breaking Load.	Elongation, per cent.
1	165	47,650	54,330	21
2	201	52,060	53,190	2
3	374	56,890	59,170	4

The Cincinnati Freight Station of the P., C. & St. L.

The *Station Agent* has an article by Mr. W. McCallister, Freight Agent of the Pittsburgh, Cincinnati & St. Louis at Cincinnati, O., from which we make extracts below. Our readers will recollect a similar article from Worcester, Mass., July 19.

"Lists of all trains arriving, showing Initial, Car, Station From, Yard to be switched to, and Seals are immediately sent to car record clerk, agent's office, who enters the train in a book noting the time depot freight arrived in depot, and time expense bills are sent to chief tally clerk. It is also the car recorder's duty to immediately see that way bills are on hand for all cars in the train: if none are on hand, he must telegraph our assistant general freight agent.

"The yard where cars of lumber, lime, sewer pipe, ice, oils, etc., are delivered contains twelve team tracks and five store tracks. The team or delivery tracks hold 100 cars, and the store tracks 50. This yard is switched during the night; all of the empties are removed, and the loaded cars that are ordered are placed in position for unloading the next day. Teamsters are not disturbed at all by the engines switching in the day time, the yard being free from all noise. We do not think it good policy to work large bulk yards in the day time, as customers should not be disturbed while unloading their freight. The store tracks are used for holding cars for which we fail to obtain room for delivery. Cars left over are the first placed, unless it should happen that one consignee gets in more cars in a day than he can unload, when only as many cars as he can handle are placed for him, which gives the other customers an opportunity to unload, and greatly assists the company in relieving the yards. It is useless to rush cars to delivery tracks regardless of consequences. We compel all of our customers to use all their teams to unload, and knowing exactly what each can do, we keep all supplied with a day's work. Notices are sent to consignees upon arrival of bulk freight in receiving yard. This enables them to have their freight paid and to be ready to haul when cars are placed for delivery. As soon as cars are placed the delivery clerk takes a list of names of all the consignees, together with the number and initial of the cars, and immediately notifies all by telephone. He begins his work at 6:30 a. m. and checks the yard with his special clerk, who immediately sends postal card to the consignee, giving him 36 hours to haul.

"The loading clerk, (in outward house) when ready to load his car, hangs a small tin sign over each car door, showing name of station, for instance, "Columbus" He then instructs his foreman of gang to take the freight to Columbus, Indianapolis or Chicago car. They do not have to remember car numbers, and the signs prevent mistakes, which might otherwise occur.

"At our Smith street station we have three tracks side by side, which enables us to place by seven o'clock a. m. 20 cars. The loading clerk immediately locates by the signs, the destination of each car; a diagram is then filled, showing number, initial and destination of cars on track numbers 1, 2 and 3, which is laid on his desk and another copy sent to manifest clerk in the office. As fast as freight is received the reciving clerk files the tickets on hooks, to load in proper billing order. These tickets are taken up by the loading clerks, who, as soon as the freight is loaded, drop them in a drawer. They are then taken by the manifest clerks, who begin billing them as soon as loading is commenced. When a car has been loaded the manifest clerks are notified, the new number and initial inserted in the diagram and the billing resumed. The freight being handled rapidly causes tickets to go into the drawer pretty fast, keeping the manifest clerks busy. Special local cars are not loaded until after 5 p. m., house-closing time; but as the clerks have the numbers and initials the freight is all billed and the tickets hung back on the hooks. We are enabled by working in this manner to close our billing in a very short time after we are through loading, enabling us to get billing off on passenger trains ahead of freight.

We take a blind tally on all in-bound merchandise: each tally clerk takes name, marks, weight, destination, etc., of each package or shipment, as it passes him. He sends in his sheets to the chief tally clerk, as soon as cars are unloaded, who immediately checks against the expense bills. Upon these expense bills the location is entered, and also on the delivery slip, but it is not on the notice which goes to the teamster. It is impossible for him to find his freight until all charges are paid, as only the cashier and delivery clerks know its location. This prevents teamsters from endeavoring to run their freight off, and from troubling delivery clerks before bills are paid. Expense bill, delivery slip, and notice are made at the same time by using indelible pencil and carbon paper, our blanks being put up in blocks to suit. Until we introduced this system, three men were employed upon one expense bill, one for the expense bill, another for the notice and a third man for the delivery slip. Now one man does the work of three, and can do much more work, as there is no delay caused by one clerk waiting on another.

We do not employ clerks to fill vacancies; we promote, only hiring messenger boys, who must be bright, intelligent well educated youths, to commence at the foot of the ladder and gradually work themselves through all the various positions. Each man is entitled to his turn, ranking by length of service and ability. This test is severe, and once in a while a man shows clearly that he has traveled as far as his ability will admit. Brighter men will then pass around him. We have no trouble with our clerks. They stay with us, knowing that, in time, they will occupy good positions. We are constantly training some in billing, so that we are always able, in case of sickness or leave of absence of any bill clerk, to fill his place. The system of promotion is a great advantage in the work, as it enables us to put our men on any desk we may desire, for all have a thorough knowledge of the business, as they must necessarily pass through all of the departments.

New Zealand Railroads.

Details of railroad traffic on the government lines throughout the colony for the past financial year are now available, and show that there were carried 3,132,803 passengers, or 309,047 fewer than the previous year. Parcels, etc., numbered 399,706, or almost exactly the same as in the previous year. The live stock conveyed was 919,319 head, being 29,862 fewer than in the year before. There was also a decrease of 5,944 tons in the wool carried (78,202 tons), but in grain and minerals there were large increases of 89,005 and 86,549 tons respectively; and there were smaller increases in merchandise, timber, firewood, chaff, etc. The total goods traffic for the year amounted to 1,920,430 tons, or 184,669 in excess of last year's figures. There were increases in all branches of railway revenue excepting passengers, parcels and luggage. The total cost of the railways open up to March 31 was £13,352,978; the net profits for the year are at the rate of very nearly 2¾ per cent.

The following is the accident record for the twelve months ended March 31, 1889:

	Killed.	Injured.
Passengers:		
From causes beyond own control	..	1
From own misconduct or want of caution	2	11
Employés:		
From causes beyond own control	..	57
From own misconduct or want of caution	4	23
Persons killed or injured while crossing level crossings	..	3
Trespassers	3	1
Workshops	..	21
Miscellaneous	3	1
Total	12	118

—*Railway and Tramway Review.*

American Elevators in England.

The American Elevator Company has received instructions to carry out the elevator service in the extension of Queen Anne Mansions (London). There are to be no less than 27 hydraulic elevators in this building, five of which are to be passenger lifts. The same company has been instructed to carry out the elevators for Albert-Gate Mansions. The standard hydraulic machine will be used throughout in both cases.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The topics before the Western Railway Club last Tuesday were of interest to the members, as was evident from the character of the discussions. Since the adoption of a standard brake gear there has been a strong movement on several roads toward the adoption of a standard shoe material and an evident desire to learn just what is the value of each class of material before a standard is chosen. As stated before the club, what is wanted is the determination of the material which will prove to be the most economical when the following points are considered: the coefficient of friction, the durability of the shoe with reference to the cost for material and renewal of shoes, the durability of the shoe with reference to the outlay and attention needed to keep the brakes adjusted as to piston travel, the wear of tires of various materials, and the selection of a shoe which will give the requisite friction with the brake beam pressure and leverages now adopted as a standard. A material which will meet these demands and considerations will be satisfactory and what is needed to put the finishing touches to the work of the Master Car-Builders' committees, who have already distinguished themselves by their successful labors over other details of braking apparatus, and who have now selected the most suitable type of apparatus, and the most advantageous foundation gear. Now, we need to know just what materials are best fitted for shoes to be run on different kinds of tires and under different conditions. It is not to be supposed that any one material will meet all the different demands. This is evident from the service of shoes on driving tires where it is found that a hard material is needed because of the excessive load per square inch of the shoe, resulting from the necessity for a sufficient brake pressure to properly retard the locomotive, with the limited area of shoes admissable. So the different kinds of tire will also call for different kinds of material, and that shoe which will do well and prove most economical on a suburban train may not be best on a through express or on freight trucks. It is pleasing to note that there are in progress on the Chicago & Northwestern experiments which, it is hoped, will prove beyond dispute, as far as that road is concerned, the value of the different kinds of shoes with reference to their friction and wear. The Pennsylvania Railroad has made such experiments, and has selected a standard driver brake shoe as a result. A knowledge of the cost of brake shoes, together with the results of experiments relative to wear and friction, will make possible the determination of the comparative value of the various materials to fulfill the demands of the different kinds of service. But little is known regarding this subject at the present time, yet the opinions expressed at the Burlington brake trials and the records thereof, as mentioned by Mr. Rhodes, and the tests by the Westinghouse Air Brake Co. to determine the causes of unusually long stops when the remainder of the gear was in good condition, and also a general knowledge of the results of frictional experiments in general, lead one to believe that the softer materials within certain (not clearly defined) limits give a higher friction for the same pressure per square inch than the harder ones. It is well-known, however, that such softer materials wear away more rapidly, and it is to chose the mean between the two extremes that careful experiment becomes necessary. A very satisfactory set of data regarding the wear of shoes in service was published in the *Railroad Gazette* Sept. 27, 1889. A well expressed opinion of one of the members states the live question now to be about thus: What material or size or shape of shoe shall we use to render possible that uniform braking power on the different wheels of a train which was hoped for and sought after by the recent committee on foundation brake gear?

The interest taken in the search for a better locomotive is indicated by the discussion at the same meeting. Many of the members present were interested, if for no other reason, because they are themselves designing or making trials of new types of locomotives, and when the subject of compounding locomotives in general was suggested they felt a desire to know how great would be the cost in time and money of making trials of such a system. They were much interested to learn the exact nature of the changes necessary to produce a compound from the ordinary locomotive. A large display of drawings and indicator cards, together with moment diagrams and diagrams from the cylinders when the pistons were used to brake trains upon descending grades, materially assisted in the elucidation of the various features of the compound system. The interest in the subject is a general one, and as the field is open to all, being almost free from patents and complications, there is an expressed desire on the part of several railroad officers to have it well and thoroughly investigated. The continued discussion of the subject at the next meeting will be watched with interest, as at that time further statistics are promised by a member who has made some experiments in compounding locomotives.

It appears that the Omaha Demurrage Bureau, the pioneer of its kind and the one which first infused a practicable degree of courage into superintendents generally, has been swallowed up in the Chicago Car Service Association, the notices which have just been issued to the public announcing the revised regulations according to the Time Convention standard, which are to go into effect Nov. 1, being headed "Omaha and Council Bluffs Division of the Chicago Car Service Association." This division includes Omaha, Council Bluffs, Sioux City, Onawa, Lincoln, Fremont, Wahoo, David City, Beatrice and Nebraska City. The object of thus grouping a number of towns under one head is, we suppose, the double one of insuring uniformity of treatment of customers at all these points and economy of management. A single manager can, of course, look after a number of places and can make available at all of them many details of good management, which would not so readily suggest themselves to the mind of a sole manager at a small town; but the distances between these sub-stations, as they may be called, is considerable, and one man must have all he can do, and be obliged to spend a large share of his time on the cars. Moreover, a great many of the delicate questions coming up in this department ought to be settled on the spot, as promptness of dealing is one important element of success. It would, therefore, appear that the local assistant in charge ought to be a person of approximately as much talent and resource as the manager himself. This being the case, the saving in expense cannot justly be made very great. Undoubtedly, the almost phenomenal success at Omaha, and later at Chicago, was due largely to this prompt removal of all causes of friction; and in varying this, even to a small degree, there is danger of taking a backward step.

The Atchison Plan of Reorganization.

The directors of the Atchison have come forward with a financial project vaster than anything of the kind which has hitherto appeared. It involves nothing less than the funding and consolidation of their complicated debt of more than $160,000,000. No railroad system has ever been reorganized on anything like this scale. To find a parallel we must look to the financial operations of national governments; and these, though sometimes dealing with larger amounts of money, have not involved so many and so complicated adjustments of rival interests.

Something of this kind had become imperatively necessary. The Atchison system was not earning its fixed charges. If it became dismembered, its prospects for earning them were still worse. A receivership, if once begun, was likely to prove long and costly. The directors, under the new *régime*, felt the need of devising some plan which should reduce the fixed charges, and yet give the bondholders enough additional security and contingent possibility of profit to compensate them. The present project is the outcome of these conditions. The security is furnished by a 4 per cent. consolidated bond issue; the contingent chance of profit, by a 5 per cent. non-cumulative income bond. These securities are offered to the various classes of bondholders for exchange at various rates. The holders of first liens will receive a relatively large proportion of mortgage bonds and a relatively small proportion of income; in the case of junior securities, or more speculative holdings, this ratio is reversed. A small portion of the new bonds is reserved for cash subscriptions.

Though nothing definite is said on the subject, the adjustments show that the consolidated mortgage fours are divided at about 75, and the income fives at about 50. Subscribers of $800 cash thus receive $1,000 in fours and $100 in incomes, giving a value of $750 in the former and $50 in the latter. Some clauses seem to indicate a hope on the part of the directors that the price for mortgage bonds will be higher than 75; but they will find it unsafe to figure on a basis much above this.

The relative rates of exchange for different issues of bonds show careful calculation and an obvious intention to be fair. Indeed, such fairness is a financial necessity, for if any offer is made too low, the holders of existing securities will stay out and make trouble, while the present state of Atchison's earnings affords no margin for making too high offers to anybody. Collateral trust fives of 1937 come off relatively well; the readjustment brings them within less than 15 points of the fives of 1,909, though the market prices of the latter have been from 18 to 20 points higher. The Atchison first mortgage sevens hardly receive what some of their holders will demand; but these bonds have only ten years to run, and the directors will probably allow their holders to stay out, rather than accede to exorbitant demands.

The plan has many things to commend it. It has been honestly and straightforwardly arranged. It does not bear traces of jobbery. It avoids assessments on stockholders. This is a specially good thing, in the case of a stock like Atchison, much of which is held by investors who could not meet such a demand without hardship. An assessment often enables the man of large capital to buy out less fortunate men at an unduly low figure. If the project succeeds, it will reduce the fixed charges of the company to $7,352,000, nearly $4,000,000 less than they now are. It will prevent the danger of a receivership, and save as much as possible of the value of the property for the actual enjoyment of its owners.

Yet the plan cannot exactly be called an assured success. The inherent difficulties of the case are so great that the most straightforward project has much to contend against. The directors have to deal with holders of bonds whose value has until recently been much greater than it is now. Even to this day the market price of most of the Atchison securities is greater than the probable value of what it is proposed to give in exchange for them. It is hard enough to get bondholders to consent to a reduction of interest; it is still harder to make them acquiesce in a reduction in the value of their principal below the figures which prevailed before the project was made public. Yet such will be the result in a number of cases if the terms of the present plan are carried out, unless fours rise higher than 75 or incomes higher than 50.

Of this result we fear that there is no immediate hope. It would facilitate matters much if the public valued the new fours at 80 instead of 75; but the public apparently does not. If the new fours were likely to command the higher figure, the right to receive a one thousand-dollar bond *plus* $100 of incomes for a cash payment of $800 would be a valuable privilege. But the stock has sold for almost exactly the same figure with or without those rights. The public estimate apparently is that a cash subscriber will not get appreciably more than his money's worth. If that is the case the holders of fives of 1909, which have been selling at 90 and upward, will be somewhat reluctant to exchange a $1,000 bond for $1,000 new fours and $200 incomes—together worth, upon this basis, only $850.

The worst of it is that the figures of earnings leave no margin either for higher interest charges or for

higher valuation of the principal. The proposed consolidation of the debt makes it easier to form an accurate estimate of the value of the securities; and the outlook is not as encouraging as could be wished. If the present plan is fully carried out, the capitalization of the Atchison system will be as follows:

Mortgage bonds	$150,000,000
Incomes	80,000,000
Stock	75,000,000
	$305,000,000

And the valuation of the whole will be:

Mortgage bonds at 75	$112,500,000
Incomes at 50	40,000,000
Stock at 30	22,500,000
	$175,000,000

Looking at the system as a whole, the net earnings certainly do not warrant a higher valuation than this, if indeed they will admit of one so high. No statement for the whole system is given in available form prior to 1888. In that year, which was a notoriously bad one, the net earnings were $6,550,000. From this we must deduct taxes and rentals, amounting to something like $1,700,000. This leaves the actual profit of the company about $4,850,000; not enough to have paid the interest on the proposed issue of four per cent. bonds, and an absurdly low figure for a property valued at $175,000,000. In 1889 things are much better. The net earnings of the whole system are running about 18 per cent. higher than last year. They will probably fall not very much short of $8,000,000. Yet from this we must deduct more than $1,700,000 for taxes and rentals, leaving actual net profit of little more than $6,000,000; barely enough to pay interest on the fours, and leaving nothing for the incomes.

It is needless to say that a net profit of $6,000,000 is small when compared with a valuation of $175,000,000. Yet this seems to represent the existing state of the case, and to show what sort of difficulties the directors have to contend with. The chance for success of their plan depends upon the possibility of getting the various classes of bondholders to look facts squarely in the face. There is no doubt that most of them will be ready to do so. Unsatisfactory as the present outlook may be, the outlook under a receivership or under a dismembered system would be much worse. If the present plan does not give the bondholders all they want, it gives them all there is to be had, and the adjustment of conflicting interests seems to have been fairly made. But there is always a minority which opposes any arrangement of this kind, and it is impossible as yet to tell just how large that minority will be. In the interest of all parties concerned, it is to be hoped that it may not be large enough to seriously interfere with the operations of the directors. The readjustment must come at some time, and it seems far better that it should come in this form than in any other.

The New Jersey Central Interlocking.

The interlocking system at the Jersey City station of the Central of New Jersey, which was described in the *Railroad Gazette* of June 28, and the use of which was discontinued within a week after it was first put in operation on account of unforeseen difficulties in handling trains, was again put into use on Oct. 6, and is now working all right. One new signal has been put in (west of the bridge, on track No. 6, for east bound movements), and the switching tracks connecting with track No. 10 (outside of the yard shown in the diagram published) have been made more serviceable. Telephones have been put in connecting the tower with different parts of the yard, and also electric bells to communicate from it to the engine house. This yard might by the laying of additional crossovers be made to accommodate more trains, but for the present volume of business the arrangement of tracks seems to amply provide for prompt movement of all trains.

In speaking of the delays to trains on the first opening of this interlocking system, we said that the facts illustrated the slipshod state of discipline on many roads; meaning by this that the delays were the result of unfamiliarity on the part of the men with the apparatus with which they had to work, and that this unfamiliarity was to be attributed to a lack of proper discipline. We referred especially to the locomotive engineers as being to blame for not fully understanding their instructions. We received, soon after, a communication from one of these runners, complaining that he and his fellows had been maligned, and stating that the real cause of the difficulty was a lack of tracks and facilities. The writer added that the engineers had carefully considered the perplexities and troubles at Jersey City and had come to the very satisfactory conclusion that, whoever might be responsible for the very bad delays, it was not the engineers; and, moreover, the Central of New Jersey had a body of the most skillful and reliable engineers in the vicinity of New York.

While the facts do not contradict our statements in material points, it is fair to say that the engineers should not by any means be saddled with the whole blame for that very bad blockade. The delays of the first two days were the basis of what was said in the *Railroad Gazette*, and the information was from sources believed to be reliable; but one of the very worst blockades, and apparently the one which finally decided the officers in going back to hand switches, occurred after our article was written, but before it reached our readers; and it is quite clear that this delay resulted from the fault of others than the locomotive runners. It seems that the means of communication between the train starter in the train shed and the men in the tower, some 1,500 ft. away, were defective, and that the person in control of the switching had not sufficiently studied the order in which movements should be made under the new arrangement. The engines from the roundhouse to take out trains (sent down from some distance out on the main track) did not reach the yard in the right order. The switching of cars in the storage yard (entirely outside the interlocking) was carried on under difficulties, and hindered movements in the station yard proper. These obstacles have been removed, as above stated, and things now run smoothly. Our criticism of the discipline, however, seems to be fully justified; more so, indeed, than we supposed at the time we wrote, as it was faulty at more points than at first appeared. But we may say to our correspondent that we did not at any time attribute the negligence wholly to him or his brethren. Some of them had not been fully posted as to the meaning of the new signals and the fine points necessary to be known in order to work under them. As was intimated in the editorial note, the person who gave out the instructions was regarded as perhaps fully as much to blame for this lack as were the men who should have read the instructions. In fact, it may be doubted whether men who have never run in complicated yards signaled with semaphores can acquire the knowledge sufficient to enable them to run an engine in such a place with promptness and confidence simply from reading a book or circular, however clear it may be. Even if this were theoretically possible, the best practical way to convey such instruction is to give the runners a bit of practice in some older yard under other engineers who are familiar with such signals; and it would doubtless have been a profitable move if the Central of New Jersey had sent a dozen or so of its runners to Broad street, Philadelphia, or the Grand Central Station in New York for the purpose of taking a few object lessons before attempting to handle the business in the Jersey City yard.

Legal Punishment of Railroad Men.

Master Mechanic Twombley, of the Chicago, Rock Island & Pacific, has been arrested for criminal responsibility for the collision at Auburn Park, Sept. 24, and has handed in his resignation. His son, the engineer who caused the collision while under the influence of liquor, was reappointed by the father after he had been twice taken off for drunkenness. The first reports were to the effect that the elder Twombley had taken this action on the advice of Mr. Kimball, Assistant to the President, but this has since been denied. Mr. Twombley is now under heavy bail bonds. Thomas Shields, the New Haven sectionmaster who caused the derailment of an express train June 28, by not properly securing a frog which he had just laid,* has been found guilty of manslaughter by a jury and sentenced to 30 days' imprisonment and $50 fine. One of the most noticeable circumstances in connection with train accidents growing from the undisputed negligence of one or more persons is the general immunity from legal punishment which the guilty men enjoy in nearly every case; engineers, switch tenders and others are quite often arrested, and the feeling of district attorneys and other prosecuting officers in this respect may be said to be growing more decided, as arrests, with some show of severity and intention of following the case to its conclusion, seem to be increasing in frequency; but the cases where a railroad employé of good moral character and fair reputation has to actually spend any length of time in prison or has to pay a large sum of money as fine are decidedly rare. It is perhaps idle to speculate on the causes of this state of things, and a comparison with similar cases in other lines of work might show that railroad men are not favored with much greater immunity than is enjoyed by other people; but it remains true that many people are killed by well-defined negligence, and no one is punished.

The daily press, so far as it has spoken, approves of the action of the courts in both the cases referred to, and this seems to be true of our exchanges, without exception. On the whole this attitude of public sentiment must be acknowledged just. In fact, if any punishment at all is to be meted out, Mr. Shields' sentence would seem to be a very light one. The *Railroad Gazette* yields to no one in sympathy for railroad men in trouble, and its editors would shrink from the responsibility of imposing sentence on either Mr. Shields or Mr. Twombley, knowing the difficulties and restrictions characteristic of so many positions in railroad service, and fully appreciating the ties of kinship which must have actuated Mr. Twombley. But, as has been well said, a man responsible for the appointment of engineers and other trainmen must in a sense regard himself as a martyr to public duty. Whatever his feelings, he must repress them. As an individual may easily be placed in a position where he must cut off his right arm to save his life, so the railroad man, responsible for the lives of passengers, must completely subdue his own personal preferences. The engineman who bravely rushes to death in a bridge disaster or collision under the noble impulse which regards the passengers' lives as of more value than his own is counted a hero. The superior who appoints engineers has a parallel responsibility, and is called upon to exhibit similar qualities of self-abnegation.

The case of Mr. Shields is more common and more difficult of treatment, but the lesson is, perhaps, one which it is still more needful for the average railroad man to learn. A hundred circumstances arise every week, perhaps every day, tempting train and station men to take chances. Risking his own life might be called one of the least of these risks, and the argument that a man may be trusted to guard the lives of passengers because his own life is involved in the question presented to him is proved fallacious every week. The problem of taking complete precaution, even where the chance of failure is only one in ten thousand or a million, presses upon the engineer, the conductor, the section master and others every day, and the unfortunate situation of Mr. Shields should impress the warning. Speaking in the interest of the public and of fellow employés, it must be said that nothing more than justice has been done in both these cases.

* The impression that Shields was pressed for time, stopping work only after the express train came in sight, is erroneous. The work on the frog, so far as done, was completed some time before the derailed train arrived, and it is claimed that several trains had passed over the place. The switch was trailing point, the frog was a spring rail frog, and the ties under it had not been tamped; the passage of the train probably loosened the spikes in the wing rail, and, the guard rail not having been replaced, the wing rail was forced out by the wheels of the engine so much that the wheels of the baggage car dropped off the point of the frog inside of the wing rail.

Teaching and Preaching.

A Philadelphia paper, in reporting the fact that the directors of the Philadelphia, Wilmington & Baltimore have just given their formal approval of the standard code, as revised for use on their road, commends the excellences of the code and the wisdom of the directors in placing it in use, and adds that "hereafter in case of any mishap resulting from the misconduct or negligence of any employé, the plea of ignorance on his part will be impossible." In this expression the reporter is probably giving the views of the directors rather than his own. The whole tenor of his report indicates that the substance of it, both as to matter and spirit, was derived from an authentic source. But the very smoothness and apparent strength of this statement are calculated to deceive the reader, who, forgetting an important fundamental principle, may easily assume, what the author of the idea expressed desires to convey, that this code of rules, issued as it has been to all the train and station men, provides for practical perfection, so far as human instrumentalities are capable of it. It has taught the men everything that can be taught them.

Without now stopping to discuss those difficulties which the best friends of the standard code admit, such as the question of a proper signal for calling in flagmen, of making the flagging rule (99) applicable to all contingencies, of making rule 108 satisfactory for all cases, and other well-known points, we wish to mention here the simple difference between preaching and teaching, which is so often forgotten. A book of rules sent to employés, with a command to read it, may be called preaching. Whether or not the men read it intelligently we will not discuss, but will admit the point sufficiently to assume that the truth has been proclaimed to them. Issuing a book of rules and sending a man afterward to question the individual and learn from their own lips that they have read and understand what it says, may be called teaching. But the assumption that men have been taught when there is no real evidence of the fact is a delusion, cherished not

only by the careless public, which credits railroad officers with superior wisdom, and by the average director who, with still more knowledge to convince him to the contrary, also acts on that assumption, but by many operating officers, who have no excuse for not knowing better. In fact, these latter probably do know better; they deceive themselves, consciously or unconsciously. Tradition and the habit of yielding to the limitations imposed by superior officers have become almost a second nature. The inward mental revolt against trusting to good fortune and to the law of chances has been suppressed so many times that it apparently stays subdued.

It is somewhat strange that the Pennsylvania, which controls the road named above, in many respects ahead of nearly all other roads in administration and discipline, should be behind others in this important particular. The employment of preaching in the place of teaching seems to be as common on this road as on many with less progressive management, the high character of its employés for intelligent and faithful compliance with rules being attributable not so much to the skill with which the instructions are given as to the care with which the men are chosen and their general intelligence. The management has selected good men, who will "catch on" to poorly expressed ideas, in contradistinction to the opposite plan, in use on some roads, of hiring a lower grade of intelligence and depending upon the skill of the superior officer to offset the men's lack of capacity by his extraordinary ability in driving ideas into dull minds. Any sensitive brakeman who reads this will pardon any seeming harshness in our language when he reflects that the offensive terms are used relatively.

It cannot be that the personnel of the Pennsylvania has been so far perfected as to remove the necessity for the best skill on the part of the division officers in dealing with it. In fact, certain prominent officers of the Pennsylvania have instituted important movements in the direction of educating trainmen and of making a proper record of the work, and some of this was done years ago, so that its merits should be well known. On certain divisions now the acquaintance of the superintendent with the qualifications and capabilities of his men is vastly better than is the case on the average road, and much better than on other divisions of the Pennsylvania. Why a company which has so successfully eliminated inconsistencies between different divisions, in other departments, should be so lacking in this line does not readily appear. The true plan, of course, on all divisions, of all roads, is to have both clear language and intelligent men; the first feature will measurably provide against possible failure in the second, and the second will return the favor; and finally, the examiner, by questioning the men, can make sure that the words of the superintendent and the thoughts of the employé have not "failed to connect."

Annual Report.

Northern Pacific.—At the meeting of the directors of the Northern Pacific Railroad Company, held yesterday, the President, T. F. Oakes, presented his annual report, from which we quote the following items: The gross earnings amounted to $20,000,000, an increase of nearly $4,000,000, even over the flattering improvement of the previous year.

Gross Earnings—		
From freight	$12,877,837	
From passengers	5,824,163	
From mail and express	1,005,466	
		$19,707,467
Operating Expenses—		
For maintenance of way	$3,216,327	
For maintenance of equipment	1,828,799	
For conducting transportation	5,726,456	
For general expenses	1,091,959	
Total operating expenses, exclusive of taxes		11,863,541
Net earnings		$7,843,926

The ratio of operating expenses to gross earnings was 60.2 per cent. Gross earnings per mile of road operated were $5,687, an increase of $765. The average earnings upon freight per ton mile were 1.429 cents, a slight decrease. The revenue per passenger per mile was 2.5 cents, a decrease of 2 mills. The increase in operating expenses of $2,837,945, compared with the previous year, is attributable in great measure to increased traffic, next to the increase in expenditures in maintenance of road, equipment and construction, indicating a degree of betterment greater than the additions to mileage. The transcontinental or through business was the most satisfactory. Of the gross tonnage between the East and the Pacific Coast terminals, north of San Francisco, including Portland, Puget Sound and British Columbia points, the Northern Pacific carried about 60 per cent. The revenues from freight forwarded and received and tickets sold at Spokane Falls were $1,579,882; at Tacoma, $2,082,504; at Seattle $925,643. Of the passenger business handled by the transcontinental lines to and from the North Pacific coast the Northern Pacific carried 54.17 per cent. The falling off in the wheat shipments on the Duluth and Manitoba branch was over 45 per cent., due entirely to shortage of the crops. The development of mining interests was more remarkable than that of any other industry. The acquisition of the Cœur d'Alene Railway & Navigation System, establishment of smelters and activity at the ore centres, afforded a very large traffic in ores and bullion. The tea business of the year shows 6,024 tons handled at Tacoma, against 3,328 tons the year before. The gross earnings of the dining cars amounted to about $248,000; expenses amounted to about $231,000, including cost of linen, silver and service, leaving a nominal profit.

Branches completed during the year amounted to 132 miles. Notwithstanding the addition of 92 locomotives, 2,409 freight cars and 49 passenger cars, the rental of other equipment necessary to handle the traffic amounted to $128,291. The expenditures for maintenance of way were for substitution of steel for iron, renewal of cross ties, replacing of wooden with iron bridges, and keeping the track in excellent general condition. The bridge over the Missouri River at Bismarck showed a noticeable movement of the eastern abutment toward the river. The trouble was found to be in the sliding of the entire section of the bluff on which the structure was built, which was overcome by cutting away a portion of the bluff and putting in large blocks of cement between. The line near Missoula, Mont., was changed to avoid two expensive bridges. Eleven hundred feet of tunneling was retimbered.

The average number of passengers per train increased 11.8; the average number of tons of freight per train and per car decreased slightly, but the average distance each ton was carried was increased 32.7 miles. Number of tons of freight eastward was 1,260,963, westward 1,617,015. Repairs to engines cost on an average $1,341 each. Cost of fuel was 44 per cent. of the entire motive power expenses. Swellings in the interior of Stampede Tunnel caused trouble, and concrete walls must be erected with a brick arch where the roof is affected. Two and a half miles of spur tracks have been constructed to reach various warehouses.

The Northern Pacific Railroad received from its express company $299,129, and the express company itself earned a profit of $127,590. The tour of the United States Senate Committee on Irrigation to the Northwest is referred to, and the importance of extensions into mining regions.

A large majority of the 208 members constituting the General Committee appointed by Mayor Grant to consider the details of the proposed World's Fair in New York, in 1892, met in the Council Chamber, at the City Hall, on Oct. 10, and received reports from the special committees. Summaries of these reports were published in the *Railroad Gazette* of Oct. 11, 1889. The report of the Finance Committee was adopted, and some amendments were referred to that committee, with power to act, also a resolution authorizing the collection of $200,000 for immediate expenses. It had been hoped by many that at this meeting a good start would be made in raising the guarantee fund of $5,000,000; and immediately after the adoption of the financial report there was reason to believe that the hope would materialize, for in the space of three minutes $285,000 was subscribed, in amounts varying from $100,000 to $5,000. Then some one suggested that this was not the proper way to proceed, and that the Finance Committee should have a chance to prepare its plans for receiving subscriptions; so the enthusiasm was dampened, and no more subscriptions were offered. The report of the Committee on Site and Buildings, emphasizing strongly the probable necessity of using a portion of Central Park, was unanimously adopted, although an amendment to exclude Central Park from the boundaries of the proposed site was offered and received one second, but was afterward withdrawn. The Finance Committee seem to be in no hurry to elaborate their plan for receiving subscriptions. A meeting of this committee was called for Oct. 14, but it was a rainy day, and a quorum was not present. While waiting for other members to arrive Mr. William Steinway, an enthusiastic member of the committee, who had already shown his faith in the enterprise by subscribing $50,000 at the meeting of the General Committee, was asked by a reporter: "Suppose there should be no quorum, would not that be an unfortunate circumstance?" "Most decidedly," answered Mr. Steinway. "It would be a black eye for the Exposition." And the reporter adds: "Thus was a black eye given the World's Fair." Chicago has opened a bureau at Washington, and has sent two members of its General Committee to welcome and indoctrinate arriving Congressmen. Other members of the committee are doing missionary work among the Congressmen of the South and West. A four-page advertising supplement, profusely illustrated, in *Harper's Weekly*, of Oct. 9, details the reasons why Chicago is the most suitable place for the World's Fair. The New York *World* remarks: "This is all legitimate and creditable. In these days it is generally the 'hustler' who gets there. New York is taking quite too many things for granted in this matter."

An inexcusable and fatal accident, resulting in the death of five passengers and the serious injury of four others, occurred on the Mount Auburn inclined plane, at the head of Main street, Cincinnati, on Tuesday last. This plane is 2,000 ft. long, with a height of 275 ft., and has a double track over which cars are raised and lowered by cables, passing over a drum and operated by a winding engine. At the time of the accident, the car, containing nine passengers, had nearly reached the top of the incline, when it was found that the engine could not be stopped, and the car was dashed against the bumpers, the cable was broken, and the car rushed down the incline and was totally wrecked. The inclined plane had been in use for twenty-one years, and it is stated that no accident had ever occurred before. Some trouble with the engine was reported early in the day to the engineer, who said that he had repaired it. In stating that this accident was inexcusable, we speak well within bounds. We have received no particulars concerning the defect of the gear, but it is well known to builders and users of hoisting and elevating machinery that such derangements do sometimes occur, and that arrangements should be made to prevent accidents by providing that the car shall be detached from the hoisting mechanism and held at the top of the incline, or by some similar device. Such attachments are usually fitted to passenger elevators, and even on coal planes, where a failure to stop the winding engine would only wreck the coal car without killing or injuring the attendants. Automatic detaching devices are often fitted at the summit.

Last Saturday morning subscription lists were opened for the ordinary stock of the London & New York Investment Corporation, Limited. The total capitalization is $5,000,000 in 100,000 shares of $50 each. Of these one-half are issued, and these shares were offered simultaneously in New York and London, and applications for $10,000,000 of stock were received in London, and for over $2,000,000 in New York, thus showing the public appreciation of the character of the enterprise. This corporation was organized this summer largely through the labor of Mr. John Greenough, of Messrs. Poor & Greenough, of New York. Among its founders are many men of high financial and business standing both in the United States and England. The object of the company is to negotiate securities and make investments of comparatively small amounts, and to associate American and English capitalists under one directory. Similar investment companies are well known and very successful in England. The present undertaking is of unusual interest here, not only from its novelty, but because it will doubtless stimulate and facilitate English investment in many American enterprises other than railroads, while it will offer an unusually good means of placing railroad securities also.

It is not surprising that we should hear sometimes that triple valves on freight cars do not work, if there is much of such carelessness as has recently come to light in one case. Complaints had been made against the action of the triples, and investigation showed that no attempt whatever was made to free the piping under the car from sand, grit and grease before placing it in position. A pile of pipe supposed to be ready for use was found in a sand bank, some of it half full of sand, and it was being put in without careful cleaning. A box of triple valves had been opened and left standing where the sand could blow into them, and on opening some of them half a handful of sand was turned out. It not infrequently happens, as a result of investigation into a reported case of inoperation, that the conical strainer is found completely filled with chips from the pipe cutters and sand packed hard with chunks of red lead. While it has been proved by numberless cases that a triple valve when properly mounted on clean pipes will run almost indefinitely without clogging, yet no one can or should expect satisfactory results under the conditions just mentioned. Such carelessness is the real and almost the only cause of the brake failures that occur.

The Galveston, Harrisburg & San Antonio and the Texas & New Orleans, roads controlled by the Southern Pacific Co., have placed the whole of their train baggage work in charge of the Wells-Fargo Express Co., which handles the baggage under the usual rules and restrictions applied to its express business, requiring the messengers to act as train baggage-masters. Nearly or quite all the lines operated being long and carrying a comparatively thin traffic, this practically reduces the number of men on trains by one, the resulting economy being shared by the railroads and the express company. These roads have on their trains a porter, who, so far as the prompt and efficient service of passengers is concerned, is as good as a brakeman, or better, and who remains in the front portion of the trains. The flagman confines himself to the rear cars as usual. This system has been in use on some portions of the Southern Pacific for two years and has given good satisfaction. Of course, at a great many of the stations the express agent and station agent are one, and the work of loading and unloading goods and the transfer of receipts and other papers is thus considerably facilitated. The Wells-Fargo Express Co. has a similar arrangement with some other roads.

A South American correspondent writes that there is a good deal of dissatisfaction in Chili with the transfer to Mr. Bernstein, of Chili, of the contract secured by the North & South American Construction Co. The terms of this transfer we do not know, but it is understood that the whole contract is given to him. Our correspondent thinks that this is a serious blow to American interests in that country, as Mr. Bernstein does not seem to have the confidence of the officials or the people. He says: "Last week I was at the Department of Industry and Public Works, and was told by a high official that the agents of an American syndicate desirous of competing for the construction of a new port were informed that the government would not consider any further propositions from American syndicates." Messrs. Comegys & Lewis have brought suit against the North & South American Construction Co., asking, among other things, that the action taken to ratify the contract with Bernstein be declared void.

The work of doing away with grade crossings in Buffalo has been advanced materially by the signing of a contract between the New York Central & Hudson River Railroad

and the city, for such part of the improvement as can be done without the co-operation of the other roads concerned. This contract was signed last Saturday. It provides for a depression of the railroad tracks through what is known as the Terrace, and for the westerly portion of the improvement. Here five streets will be carried over grade. As the track proceeds eastward the grade rises, and some ten streets will be carried underneath. The estimated cost of the work involved in this contract is about $3,000,000, of which the city of Buffalo will probably pay about $450,000. Two-thirds of the cost of the approaches outside of the railroad property will be borne by the railroad and one-third by the city. The cost of acquiring land necessary for the improvements will be divided in the same proportion. Work is to be begun within three months of signing the contract.

NEW PUBLICATIONS.

The Working and Management of an English Railway. By George Findlay, General Manager London & Northwestern Railway. 8vo, 270 pp., with index. Illustrated. London: Whittaker & Co., 1889.

This little book had its origin in a lecture delivered by Mr. Findlay at the School of Military Engineering at Chatham. The volume, as it now appears, treats of the organization and general management; permanent way, signals, telegraph and rolling stock; operation, rates, fares, division of traffic, and the railway clearing house; the relation of the state to the railroads and the law as between the companies and the public, and finally, of the railroads as an arm of defense.

An astonishing amount of information is compressed into these 270 octavo pages. As each subject is taken up a brief history of its development is given, thus putting before the reader an outline of the history of English railroads. The history is in each case followed by a description of the present practice of the London & Northwestern. Of course all this must be brief, but the author has avoided the common mistake of those who undertake to treat a large subject briefly. He devotes little space to general statements, but gives us definite and precise dates, dimensions and quantities. The result is that he has made a real book of reference, from which the student may get much convenient and useful information concerning one of the most important and highly organized railroads of the world. A few items put in the form of a table will serve to recall to the mind of the reader the relative extent, traffic and earnings of the London & Northwestern and two or three railroads of the United States, and will give an idea of how important a system it is. The figures are given for the year 1887 in each case.

	Miles operated.	Millions of passengers carried.	Millions of tons of freight carried.	Gross traffic revenue. Millions of dollars.
London & Northwestern	1,800	56	34	$51
Pennsylvania Railroad	2,346	36	50	55
New York Central & H. R	1,447	16	15	35
New York, Lake Erie & Western	1,610	8	20	24
Chicago, Burlington & Quincy	4,239	6	10	28
Chicago, Milwaukee & St. Paul	5,355	6	8	25

Dictionary of Electrical Words, Terms and Phrases. By Edwin J. Houston. Published by The W. J. Johnston Co., New York City. Price $2.50.

This is a handy volume of 656 pages, the character of which is indicated by its title. There are over 2,500 words and phrases, each of which is printed in heavy-faced type, quickly distinguishable from the descriptive matter that follows. This plan makes the ideal work of reference, typographically. There are about 400 illustrations, covering a great variety of electrical devices and processes, which, together with the extensive and careful definitions given of all important terms, serve to make the book more of an encyclopædia than a dictionary. So far as we have been able to examine it the definitions seem to be clear and accurate, though the author modestly states that inaccuracies and doubtful definitions are probably somewhat numerous. The work, however, is a pioneer, and the science to which it refers is growing so rapidly that perfection is not by any means to be expected.

American Amateur Photographer—Monthly. W. H. Burbank, publisher, Brunswick, Me. There are few classes of men among whom amateur photographic outfits have found more extended use than among engineers and railroad men. To such this monthly magazine will be of interest and value. Its engraved specimens of photographic work are exceptionally well done and instructive, while its practical articles on all the details of focusing, development and printing and the latest improvement in devices and methods will be of material assistance.

Mild Steel for Railroad Bridges.

The following note, taken from a paper which appeared in the *Revue Générale des Chemins de Fer*, is published in the "Abstracts of Papers," Institution of Civil Engineers: In this and a preceding paper the Gagnières viaduct, having three openings, is described and discussed. The author, at the same time, deals with the general properties of mild steel (*fer fondu soudant*), and its adaptability for the material of railroad bridges. The steel should be of great purity, having no foreign matter other than carbon and manganese. It appears to be established that the proportion of carbon should not exceed 0.2 per cent, and that of manganese, at the most, 0.3 per cent. Steel having a silky fracture is preferable to that of a granular fracture. The results of fracture have been found as follows:

	Silky.	Granular.
Breaking weight	26 tons.	23½ tons.
Extension in 4 in. (100 mm.)	30 per cent.	20 per cent.

BRIDGES OF IRON AND OF STEEL.

Bridges.	Resistance per square inch. Elastic limit.	Resistance per square inch. Rupture.	Extension in 4 in.	Formation of rivet holes.	Rivets.
	Tons.	Tons.	Per cent.		
Iron bridges	11.43	26.67	6	Punched	Iron.
Steel bridges—					
Military, for railways, 1882	12.70 to 13.33	27.94 to 29.84	20 to 12	Drilled	Steel bolts.
Road bridge, Rouen	13.97	31.75	18	Punched and drilled.	Iron.
Bridge over the Braye	15.24	27.94	24	Do.	Steel, 24.13 tons, 28 per cent
Viaduct of Coulain Court street, at Paris-Monmartre		28.57	20	Do.	Iron.
Bridge over the Rhone, Lyons	15.24	29.84	24	Do.	Steel, 24.13 tons, 28 per cent.
Mild steel bridges—					
Viaur viaduct	15.24	26.67	20	Do.	Iron or steel.
Road bridge, Arenc, 1886 Lyons Railway Co	16.51	26.67	20 long 18 across	Do.	Iron, 22.86 tons, 18 per cent.
Iseron bridge, 1887 Lyons Railway Co	15.24 long 13.97 across	26.67	25 long 18 across	Punched	Mild steel, 22.86 tons, 30 per cent.
Gagnières bridge, 1887 Lyons Railway Co					

The preceding table resumes the general conditions of the material which has been specified for various steel bridges in France since the year 1882.

From this table it appears that mild steel has been selected, and that the quality was milder and milder until 1886, when the Lyons Railway Co. arrived at the employment of very mild steel (*fer fondu souadble*). The following are the specified characteristics for 1886 and 1887:

	1886.	1887.
Elastic limit	16.51 tons lengthwise. across.	
Breaking resistance	26.67 "	26.67 tons.
Extension lengthwise	20 per cent.	25 per cent.
Extension across	18 "	18 "

It is notable that, according to the latest specification, the rivet holes are simply punched to the final size. It is held that the metal around the hole is partially annealed by the heat of the rivet when placed.

Simple and Compound Stationary Engines.

Mr. Walter Meunier has recently made some experiments with different types of stationary engines for the Alsatian Society of Steam Users. The results obtained may be of interest and value to steam users in this country. In the table which follows, the figures for each engine are the averages of five tests.

COMPARATIVE TABLE OF THE PERFORMANCE OF SINGLE AND DOUBLE CYLINDER ENGINES.

Type of engine.	Indicated horse power.	Pounds of water hourly per indicated horse power.	Remarks.
Compound Engines.			
4 slide valves	65	16.42	Cranks at 90 deg.
Wheelock	124	16.16	Single tandem.
4 flat slide valves	251	16.06	Cranks at 90 deg.
Wheelock	304	15.93	Double tandem.
Corliss Berger	306	16.15	Cranks at 90 deg.
Average	210	16.14	
Single Cylinder Engines.			
Corliss-Creusot	150	17.18	
" "	154	17.27	
Corliss-Berger	212	16.99	
Old type Corliss	302	18.26	Double engine.
" " "	256	17.92	" "
Average	215	17.52	

The difference between average consumption of steam in the two types is 17.52 — 16.14 = 1.38 lbs., or 8.55 per cent. in favor of the compound engines. But the efficiency of the compound engines, as measured by a friction brake, was only 88.15 per cent. of the indicated horse power, while that of the simple engines was 91.15 per cent., giving a difference in favor of the latter of 3 per cent.; so that the actual economy of the compound engine was 8.55 — 3 = 5.55 per cent.

Comparing the simple Corliss-Creusot engine with the Wheelock compound, the difference in steam consumption is 17.18 — 16.16 = 1.02 lbs., or 6.31 per cent. in favor of the compound. Comparing two other engines of recent construction, the simple Corliss Berger with the compound engine having four flat slide-valves, the difference is 16.99 — 16.06 = 0.93 lbs., or 5.79 per cent. in favor of the compound engine. The average economy of the compound engine, in these two cases, when the indicated horse power is compared, is 6.05 per cent., or only 6.05 — 3 = 3.05 per cent., when the effective horse power is made the basis of comparison.

Some conclusions drawn from these experiments by Mr. Meunier are summarized below.

In each special case all the details must be carefully considered before deciding which type of engine is to be adopted. A calculation should first be made to determine whether the interest on the additional cost of the compound engine is greater than its annual saving in fuel. In the second place the cost of attendance and supplies is larger for a compound engine than for a simple motor of the same power.

For large power the compound engine is preferable, both on the score of economy and smooth working when the load is constant. But if the engine is not to develop more than 250 horse-power, Mr. Meunier thinks that the modern simple engine, which has been so much perfected of late, is to be preferred on account of its simplicity.

The Inspection of Riveted Bridge Work.*

Riveting is an abstruse subject even when taken at its best—that is, when it is done as well as it can be in practice. No one can say with certainty just what stress a rivet in a piece of work is subjected to, because in most cases the conditions are such as to utterly defy analysis. The inspector's task is therefore a fault-finding one, and unless he is possessed of an extraordinary amount of tact, or is willing to let poor work pass, he generally manages to get himself ardently disliked by the contractor and his workmen. Almost the first thing which commends itself to his attention is the matter of loose rivets. A loosely-driven rivet has only from two-thirds to seven-eighths of the shearing resistance of one tightly driven, and hence it is extremely important that the holes should be well filled.

The method of testing is by striking each rivet a light blow with a hammer, when the loose ones can be easily discovered, either by the sound which they give out or by the hammer appearing to cushion against them. A little practice will render one very expert, and it would be an easy matter to detect bad work if the rivets were left exactly as they were driven. There are tricks in all trades, however, and just here is the place for the riveter to get in one of them if he thinks he will not be caught by the inspector. He does not like to have his rivets condemned because they are loose, and it is a very easy matter to run a calking tool around the edges of those which are so. They will then feel and sound all right, and the mark of the calking tool will not be noticed unless it is especially looked for. Another way of accomplishing the same end, and a far more dangerous one, because it cannot be detected even by an experienced inspector, is to place the "snap" sideways upon the rivet and strike it two or three blows with a sledge. It will then appear to be tight, partly because it is bent and partly because the snap cuts a ridge in the plate and forces the metal against the head. All rivets tightened in this way show this ridge below the heads, but a similar mark will often be made in shaping the head of a perfectly tight rivet, so the inspector cannot condemn work simply because this mark appears. All such work should be regarded with suspicion, however, and a sharp watch kept upon the workman.

In testing, the inspector should always, if possible, go to the "held up" head. Few inspectors do this, the majority preferring to strike the other side. A rivet may be perfectly tight on the head, while in consequence of poor heating it may be readily moved on the "held up" side. Besides, the riveter cannot tamper with that part of the rivet, and any mark there will show that he has been trying to conceal bad work.

When a rivet is found to be loose it should be cut out and replaced by one tightly driven, except in some cases where the cutting would do more harm than could be made up for by having it re-driven. This would be the case where there are three or more plates which do not assemble accurately, thus not giving a "fair" hole. When the rivet is upset it fills the uneven space, and if an attempt is made to back it out the plates are strained or torn. In such cases it would be better to allow it to remain.

Almost all text books on the resistance of materials deprecate the drifting of rivet holes, because of the weakening effect caused by it. Specifications frequently read: "All rivet holes must be so accurately punched that when the several parts forming one member are assembled together a rivet $\frac{1}{16}$ of an inch less in diameter than the holes can be entered not into any hole without reaming or straining the iron by drifts." It is not usual to find work as accurately punched as this, and in most cases a certain amount of drifting is allowed, as the extra strength gained in reaming the holes would not be commensurate to the time spent upon it. This matter of drifting is, however, a subject of discussion, as some engineers will not allow a drift pin on the work, while others, though not openly approving of them, look upon them as a necessary evil. The whole question resembles that of drilled versus punched holes. English engineers condemn the American practice of punching holes as barbarous, and say they should be drilled; while the American engineers retort that they can afford to put a little more metal in the work and still save money on account of the less time consumed.

Another defect to be guarded against is that of burned rivets. The only way of avoiding this is by having skilled heaters and watching them closely. There is no way of telling after a rivet has been driven whether it is burned, for the head may look perfectly good while the shank is badly damaged. Sometimes one seemingly perfect will snap off at the first blow of a sledge almost as if it were tempered steel; whereas if it had not been injured it would have taken twenty or thirty of the same blows to cut it off. The burning of rivets is not always accidental. Often, if the rivet is so long as to more than fill the snap, the heater will "waste" the end; that is to say, he will burn it so badly that it will crumble off. Of course, this also affects that part of the shank which remains, and should be prohibited.

These are the principal points which the inspector of riveting should watch. There are many others which will arise on every piece of work; but they are minor ones, and are, as a rule, easily discovered and the consequent bad work rectified.

* By Charles F. Parker, M. E., in the *Stevens' Indicator*.

TECHNICAL.

Locomotive Building.

The Baltimore & Ohio has now received the last of the 11 locomotives recently ordered from the Baldwin Locomotive Works, which are arranged for burning coke fuel.

The Altoona shops of the Pennsylvania have nearly completed four Class "O" passenger engines. Three of these are for the Chicago, St. Louis & Pittsburgh, and the other is for the Jeffersonville, Madison & Indianapolis.

The Rio Grande Western has received four freight engines from the Baldwin Locomotive Works and 11 more are now on their way to Denver. The engines are consolidations and have 46-in. driving wheels 20 × 24 in. cylinders and 56-in. boiler.

Car Notes.

The Pennsylvania Company is building two passenger coaches which are to run between Pittsburgh and Washington, Pa. The cars will be fitted with Forney car seats and lighted with the Frost carburetted light.

The Georgia Southern & Florida Ry. Co. has just placed

an order with the United States Rolling Stock Co. for 300 fruit cars, to be equipped with the Dunham combination fruit car door.

The Baltimore & Ohio resumed work this week at the Mount Clare shops and several hundred men are now being employed. Work is to be started immediately on the cars for four new vestibule trains.

The Indianapolis Car & Manufacturing Co. is working on orders for coal cars from the Pittsburgh & Lake Erie, Missouri, Kansas & Texas, and the Choctaw Coal & Railway Co. The company is completing 25 cars a day on these orders.

Bids were received last week by the Fort Wayne, Cincinnati & Louisville for building 100 new box cars and the contract will be awarded this week.

James Harris & Co., St. John, N. B., are building six passenger cars with 47 in. Krupp wheels, for the Intercolonial road.

Bridge Notes.

The new iron bridge over the Princess Louise water basin at Quebec was placed in position last week.

A new iron bridge over the Oconee River at Milledgeville, Ga., was finished Oct. 12. It was built by George Craft, of Atlanta, and cost $12,000.

The Philadelphia & Reading this week awarded a contract for building a bridge on the line of the Ford Road in Fairmount Park, Philadelphia.

The city council of Indianapolis has passed an ordinance empowering the Indianapolis Union Railroad to build a viaduct across the company's tracks on South Meridian street. There are several points to be settled between the city authorities and the company before work will begin, but the contract will probably be let this month.

The Huntingdon & Broad Top road this week completed a new iron bridge at Stonerstown, Pa., to replace a wooden one washed away in the June floods. The bridge is 465 ft. long, with two stone piers, and is 40 ft. above the river.

The Phœnixville Bridge Co. is reported to have commenced work on the foundations for one of the piers of the new bridge to be erected over the Ohio River between Louisville, Ky., and Jeffersonville, Ind. The bridge will be about 1,700 ft. long, and including approaches, 3,800 ft.

The Little Rock & Argenta Bridge Co. has applied for authority to construct a wagon and street car bridge across the Arkansas River between Little Rock and Argenta. The bridge is to cost about $200,000.

The iron bridge of the Pennsylvania, Poughkeepsie & Boston across the Delaware River at Portland, Pa., was completed last week and a train run over it. It is 1,600 ft. long and 70 ft. high.

The Pacific Bridge Co., of San Francisco, has been awarded the contract by the county commissioners to build an iron bridge at South Main Street, Colfax, Wash., for $9,750.

The county commissioners have let the contract for building a bridge over the Blue Earth River at Rapidan, Minn., to cost $2,665.

The New York State Superintendent of Public Works has let the contract to the Rochester Bridge & Iron Works for the superstructure of an iron bridge at George Creek, Rome, N. Y., for $2,988. The Superintendent will readvertise for bids for building the superstructure of the Fultonville bridge, at Main street, Utica.

The Mayosville Bridge & Improvement Co. has been chartered at Richmond, Va., to build a toll bridge over the James River, between Richmond & Manchester.

The following bids for the construction of a bridge at Auburn, N. Y., were received by R. J. Carson: Wrought Iron Bridge Co., Canton, O., $39,497; Dean & Westbrook, 32 Liberty street, N. Y., No. 1, $39,900; No. 2, $39,800. Penn Bridge Co., Beaver Falls, Pa., $40,100. King Iron Bridge & Mfg. Co., Cleveland, $40,180, $38,380, $1,500 extra for ½ bridge span. Pittsburgh Bridge Co., Pittsburgh, $39,700. Groton Bridge & Mfg. Co., Groton, N. Y., two-span, plan A, $37,500; plan B, $38,000; plan C, $37,000; plan D, $38,000. The Berlin Iron Bridge Co., East Berlin, Conn., plan A, $40,400; plan B, $39,490; plan C, $38,500. The contract was not let.

Bridges are proposed at the following places: Evansville, Ind.; East Liverpool, Pa.; Jefferson, Tex.; Clintonville, Wis.; Dubuque, Ia.; San Jose, Cal.; over East River avenue, Fair Haven, Conn.; at Ninth street, Bay City, Mich.

Manufacturing and Business.

The Jull Manufacturing Co., of Brooklyn, N. Y., has received an order for a Jull excavator from the Pennsylvania Railroad, which is now in course of construction at the Rogers Locomotive & Machine Works at Paterson, N. J.

The Gold Car Heating Co. has lately opened a branch office in Chicago, at No. 15 Tribune Building, being represented by Mr. Robert K. Runyon.

The Dunham Manufacturing Co. report the following roads as lately placing orders for cars upon which the Dunham door has been specified; Lake Erie & Western, 200 box cars; Lake Shore & Michigan Southern, 300 box; Colorado Midland, 200 box; Georgia Southern & Florida, 300 fruit.

The Van Dorston Cushioned Car Coupling Equipment Co., of 308 Chestnut street, Philadelphia, recently acquired a large property adjoining the tracks of the Philadelphia & Reading on Reaney street, in Chester, Pa., and has let contracts for erecting suitable buildings for the manufacture of the Van Dorston cushioned coupler, cushioned draft gear and new central buffer for freight cars. These shops will be rapidly pushed to completion and occupied by the company at an early date. At the present time the company is busily engaged in fitting up both passenger and freight equipment for the Philadelphia & Reading with the Van Dorston coupler and its other appliances, notably cars running in the fast passenger service between New York and Washington; also the private car of General Superintendent Sweigard. Negotiations are also pending between the company and several other prominent railroad lines for the equipment of their rolling stock with the coupler and other appliances manufactured under the Van Dorston patents.

The National Hollow Brake Beam Co., of Chicago, reports very satisfactory business. Orders for 6,000 brake beams were received during the first ten days last month. Large shops are now being erected in Chicago for manufacturing the brake beam. The capital stock of the company has been increased and new officers elected, as follows: H. D. Loughlin, President; E. B. Leigh, Vice-President and Treasurer; A. Crandall, formerly connected with the Dunham Manufacturing Co., Secretary, and L. C. Burgess, Superintendent.

The Samson Cordage Works, of Boston, has recently increased its plant for making solid braided cord, nearly doubling its capacity.

The Morgan Engineering Co., of Alliance, O., is constructing for an Eastern firm what is, perhaps, the largest steam hammer ever made in this country. Its weight complete will be 600 tons, of which 450 tons will be in the anvil block. It is to be used in forging steel for armoring vessels and constructing cannon for the government.

The Bucyrus Foundry & Manufacturing Co., Bucyrus, O., is running day and night upon steam excavating machinery. Last year the company added many new and heavy tools to its plant, and built a new erecting shop for heavy work, 180 × 45 ft., fitted with overhead traveling cranes. The company in its past fiscal year shipped 48 steam shovels and 16 dredges, many of them large machines, beside a large number of railroad wrecking cars and other machinery.

Messrs. John A. Roebling's Sons Co., after trying the Aerated Fuel Co.'s system on its wire furnaces for a month, has recently placed an order with W. S. Collins, the licensee of the system, 171 Broadway, New York, for 72 burners to fit up 36 of these large furnaces. Mr. Collins reports other important orders lately received.

Iron and Steel.

Carnegie, Phipps & Co., Limited, of Pittsburgh, will soon make some important improvements in their Homestead Steel Works, at Homestead, Pa. The most important will be increasing the size of rolls so that 30-in. beams can be rolled. This plant is being operated to its utmost capacity at present.

Ground has been broken for two 150-ton furnaces in Middlesborough, Ky. Work will be pushed vigorously to completion. It is reported that Eastern parties propose to erect two 50-ton charcoal-iron furnaces at the same place. Advices from London also report the organization there of a company to carry on iron and steel manufacture at Cumberland Gap. After drifting 325 ft. into the mountain a vein of Oriskany ore has been found on the property of the American Association at Cumberland Gap.

For steel plates for the battle ship "Texas" there were but two bids opened at the Navy Department last week. The lowest was from the Linden Steel Co., who bid $43,532 for 256 tons of protective deck plates, and $73,438 for 415 tons of similar plate for middle layers and redoubts. The other bidder was Carnegie, Phipps & Co. The bids were rejected.

The Paige Tube Co., of Warren, O., is arranging to light its works with electricity, and will start up next week, giving employment to about 400 hands. The company is the successor to the Warren Tube Co., having purchased its plant and made extensive improvements to it.

Last week a fire broke out in the Tenth street mills of the Oliver Iron & Steel Co., in Pittsburgh, and one of the main buildings was destroyed, entailing a loss of $200,000, partially covered by insurance. The burned building contained the general offices of the company, a packing room, car shops, machine shop, blacksmith shop, press room and fitting room. The rebuilding of the structure will be commenced at once, and it will be the same size as the old building. None of the other parts of the mill are affected by the fire.

The Pennsylvania has awarded contracts for 40,000 tons of steel rails to be delivered during 1890. The quantity needed will be contributed jointly by the Edgar Thomson and the Pennsylvania Steel Works and the Cambria Iron Works. The same establishments supplied the company's last order for 45,000 tons, which was given early this year.

Contracts have been signed for building three new iron furnaces in Southwestern Virginia, one at Salem, one at Graham, Tazewell County, and one at Buena Vista, Rockbridge County. The first two are on the line of the Norfolk & Western. The stockholders of the new furnace company have just organized at Roanoke, with Colonel Sands, General Manager of the Norfolk & Western, as President. The company will arrange for letting the contract to build a 150-ton furnace in the western suburbs of this city, and it is expected the contract for one at Rural Retreat, Wythe County, will be let in a few days.

The Reading Iron Works, in Reading, Pa., which failed six months ago, this week mailed all its creditors circulars offering them four per cent. mortgage bonds, guaranteed by the Philadelphia & Reading Railroad, at the rate of 50 per cent. of their claim. The stockholders of the Reading Iron Co. have voted to increase the indebtedness of the company $600,000, which will become necessary by reason of improvements made and of the purchase of two additional furnaces. The present indebtedness is over $500,000.

New Shops and Stations.

The Canadian Pacific will erect large works at Hochelaga, near Montreal, for manufacturing the company's own rolling stock. The shops will consist of wood and iron working and erection shops, and an extension foundry to make castings and car wheels. The works are expected to be in operation by Jan. 1 next. The company has for some time been building its own locomotives at the Montreal shops, where there are facilities for turning out a locomotive every five days.

The Grand Trunk is erecting workshops at Peterboro, Ont., which, it is expected, will be completed this month, when the present shops at Uxbridge will be closed. It is the intention of the company to concentrate the work of the Midland Division at Peterboro.

Lindenthal's North River Bridge.

Mr. Gustave Lindenthal is preparing a model 35 ft. long of his proposed bridge to span the Hudson River from about Fourteenth street, New York, to the New Jersey shore. As our readers will remember, the main suspended span of this bridge is designed to be 2,850 ft.

Metallic Ties in France.

Mr. Clerc, Chief Engineer of the Western Railroad (France), has published a favorable report upon a special tie for his company, which uses double-headed rails exclusively. It is a bar of steel of U section reversed, 8 in. wide, 3 in. deep and 7.2 ft. long. At the rail bearings chairs are cast upon the ties, extending over the edges and completely enveloping the ties for a width of 4 in. Moreover, there are holes or notches in the vertical faces of the ties, and these, being filled with molten metal at the time of casting, secure the chairs rigidly. This tie, it will be seen, has no removable attachments, and consequently is free from the deteriorations of such parts. The resistance to spreading is seven times as great as that of an ordinary metallic tie, and twice as great as that of a wooden tie. Besides, the chairs upon which the rails rest have a surface two and a half times as great as that of ordinary chairs. The cost price of these ties is $2.80 each, but there is no outlay for fittings. The Western Railroad Company, after testing these ties for two years in places exposed to the most severe traffic, has just ordered 5,000. The editor of the *Moniteur Industriel* (from which this account is translated) makes the following comments: "We venture to remark that, although these ties are of very simple design, yet since the chairs are rigidly fixed it will be necessary to use and hold in reserve ties with chairs set at different widths for the progressive variations of gauge on curves, which may be somewhat expensive. In other systems the tie is in one piece, but the method of securing the rails allows all required adjustments of gauge. Experience must settle which of these two complications offers the least practical inconvenience. It may also be noted that the advantages of a double-headed rail are generally esteemed to be chimerical, and that this rail has been abandoned by all but one or two railroad companies."

Steel Ties.

The Chicago & Indiana Western has put down a third of a mile of track with steel ties for experimental purposes.

Electric Street Railroads.

The *Electrical World* of this week publishes a table giving the names of the electric street railroads in the United States. The table gives the location, length of track, number of cars and other information concerning each road. An effort is also made to give the cost of operation, but evidently the necessary information has been procurable in but very few cases. The table gives 1,260.3 miles of track and 1,884 cars, operating on 179 roads.

Car Heating.

The Pennsylvania Railroad is equipping a good deal of its passenger stock with the return system, which we described in detail last spring. It will be remembered that an experimental train was fitted up and run with great satisfaction toward the close of the winter. The system was not, however, brought to its final form before the close of the severe cold weather, so that the tests of it were not so conclusive as desired.

Pneumatic Block Signals on the Central of New Jersey.

As we have already announced, the Central of New Jersey is about to put in the Westinghouse pneumatic block signal system from the Jersey City yard to Bergen Point. Four and one-half miles is four-track and the remainder double-track road. There will be 59 blocks, varying in length from 1,200 ft. to 2,600 ft. The system is the same as that in use between Pittsburgh and Wilkensburg, with a home and distant signal at each block. It is hoped that the apparatus will be in service before the end of this year.

A Persian Railroad.

It is reported that the Russian Government is arranging for the construction of a railroad from Askabad, on the line of the Transcaspian, 150 miles, to Meshed, Persia.

The Goliath Rail in Germany.

The Sandberg Goliath rail, weighing 105 lbs. per yard, will be put down experimentally on the Berlin-Potsdam line, which is particularly well adapted to test the merits of the heavy section.

Pintsch Gas for Car Lighting.

The Safety Car Heating & Lighting Co. expects, within a very short time, to considerably extend the use of the Pintsch compressed gas for train lighting. The passenger stock of the Denver & Rio Grande Western is now being equipped with the Pintsch light. The company is building works for making and compressing gas at Ogden. The Denver and Rio Grande is also arranging for gas works at Denver. Works for the New York Central & Hudson River at Mott Haven are completed, and the works in Chicago will be ready to furnish gas in a week or ten days.

The Cloud Joint.

We are informed that 175,000 Cloud rail joints have been ordered by one company in California. A description of this joint was published in the *Railroad Gazette* of Oct. 4.

The "Vesuvius."

The last official test of the United States cruiser "Vesuvius" was made Oct. 8 to test the range and rapidity of firing the three dynamite guns furnished by the Pneumatic Dynamite Gun Company. Two previous trials for speed of vessel and accuracy of firing had terminated successfully; a mean speed of 21.6 knots per hour being attained. On the occasion of the last test a measured mile course was staked off and projectiles were discharged from the three guns, striking, respectively, 320, 350 and 100 yards beyond the mile limit. The contract for these guns provided that one shot should be thrown every two minutes, or 15 shots in 30 minutes. It will be seen by the following table, that five shots were fired from each of the three guns in about half the time allowed. The projectiles were 15 in. in diameter, each weighing about 527 lbs. The three air reservoirs were charged with air at a pressure of 2,000 lbs. per sq. in., this being reduced to an initial pressure of 750 lbs. on admission to the guns.

No. of shot.	Gun.	Time elapsed from zero. Min.	Sec.	Loss of pressure in reservoir, lbs., per sq. in.
1	Port	0	53	70
2		1	45	74
3		2	37	74
4		4	15	76
5		5	11	78
6	Centre	6	06	105
7		7	04	109
8		7	55	114
9		9	00	104
10		9	58	96
11	Starboard	11	13	118
12		13	03	112
13		14	37	105
14		15	45	120
15		16	50	118
Maximum interval between shots				1 min. 50 sec.
Minimum " " "				0 " 51 "
Average " " "				1 " 7⅗ "

Mr. Dana Dudley has recently invented a new dynamite gun, the patent for which has been purchased by the Hotchkiss Ordnance Co., Ltd. This is also a pneumatic gun, but the requisite pressure for the dynamite projectile is generated at each discharge by firing an explosive in a separate chamber, a safety vent being provided to regulate the pressure.

Another Ocean Race.

The "Teutonic," of the White Star Line, the "City of New York," of the Inman Line, and the "City of Rome," of the Anchor Line, all passed Roche's Point at about the same time, on Oct. 3, and although ocean steamers never race, if the agents of the different lines are to be believed, it was well understood that each steamer would do it best to reach Sandy Hook the first. The "Teutonic," which won the race, had been fitted with new propellers, having a pitch of 19.2 ft. and a diminished diameter of 1 ft.; the former pitch being 21½ ft. Under the changed conditions, the revolutions were increased from 70 to 79 a minute, the daily coal consumption was increased from 212 to 240 tons, and the gain in speed was from 17 knots per hour, with the old system, to 18⅓. The weather was not very favorable, and the chief engineer expects to do still better in the future. The trip was made in 6 days, 6 hours and 27 minutes, beating the "Teutonic's" previous best record. The distance run was 2,782 nautical miles, the daily runs being as follows:

	Knots.
To noon, Oct. 4	407
" " 5	456
" " 6	451
" " 7	471
" " 8	469
" " 9	460
To 4:22 p. m., Oct. 9	88

The "City of New York" reached the bar at 7:40 p. m., Oct. 9, and at 10:10 p. m. was aground near Gedney's Channel, and was hauled off about 36 hours later on the occurrence of a favorable wind and tide, not being damaged in the least, to all appearance. The vessel was in charge of a pilot at the time, the night was clear, and no satisfactory reason has been furnished for the mishap. The captain, in his report to the Inman Co., states that: "We were in a good position for entering Gedney's Channel, having just starboarded. We had just rung half speed, when, as I was standing on the side of the bridge, I heard the pilot give the order, 'port.' I immediately told the pilot, 'Don't port; you will have the ship ashore; hard a-starboard.' The latter order was carried out, but it was too late; the ship refused to answer her helm. The reason the pilot afterward gave to me for porting was that he feared to go too close to the turning buoy."

The pilot has not yet made any reply to this compromising report, but judging from the statements made by other pilots, the excuse will be the confusion caused by the recent change in the arrangement of the lights, and the fact that Gedney's Channel is only 1,000 ft. in width.

THE SCRAP HEAP.

Notes.

The yard trainmen in the yards of the Pennsylvania company, at Toledo, O., struck Oct. 10 for higher wages.

The Missouri, Kansas & Texas last week made a wholesale discharge of passenger conductors, five being "let out" at one point.

The Lake Shore & Michigan Southern has arrested two conductors for selling tickets to scalpers, and has discharged two others.

The Buffalo, Rochester & Pittsburgh has recently taken off the train collectors who have been employed on trains for several months past.

F. J. Warner, one of the ticket agents of the Wagner Palace Car Co., at New York City, is missing, and his accounts are $1,500 short.

The railroads of Massachusetts begin with the quarter ending Oct. 1 to report earnings quarterly to the Railroad Commission in accordance with the new law. The Commission allows the roads 40 days for making up the reports.

The new passenger station of the Philadelphia & Reading at Atlantic City, N. J., is rapidly nearing completion. The entire building is to be heated by the Williames steam heating system, and lighted by electricity, as well as gas, the fixtures for which are to be of original design. The ladies' waiting room is to be elegantly furnished and the floor covered with rich velvet carpet. Both outside and inside the station is very handsome, and it is also quite commodious.

A memorial parade was held at Pleasant Valley, Pa., Oct. 10, to commemorate the death of 34 victims of the Mud Run disaster. Business in town was suspended, stores and dwellings all being draped in mourning. A parade of Catholic societies also took place. High mass was held at St. Mary's Church in the morning. At the cemetery prayers were offered for the souls of the dead, and the graves were decorated. There were nearly 4,000 persons present.

This is a Joke.

Guard—Now, miss, jump in, please; train going on. Child—But I can't go before I have kissed mamma. "Jump in, miss; I'll see to that."—*London Tid-Bits.*

Mr. L. S. Coffin Injured.

Mr. L. S. Coffin, lately Railroad Commissioner of the State of Iowa, was seriously injured by an infuriated cow at his Willow Edge Farm Saturday morning. He was tossed around the pen and badly bruised and gashed, only escaping death because of a turn in the cow's horn, which prevented her effectually goring him. Mr. Coffin has been seen to weep copiously while publicly adverting to the barbarities inflicted upon railroad employés through the failure of the railroads to employ automatic couplers, but it is surmised that if he could have had full sway with an old style link and pin, about the time that cow was running wild while he was using all the steam he could carry to get past her onto the siding, he would have been content to let well enough alone. Probably Mr. Coffin would admit now that for some purposes the old-fashioned device has not been surpassed by any of the bifalutin inventions of these latter days. —*Exchange.*

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Illinois the plaintiffs contracted to do certain construction work for a railroad, "under the direction and supervision of the chief engineer * * * and his assistants, by whose measurements and calculations the quantities and amounts of the several kinds of work * * * shall be determined, and whose determination shall be conclusive upon the parties. * * * The said chief engineer shall decide every question * * * relative to the execution thereof, and his decision shall be binding and final." The work was done under the supervision of an assistant engineer, who each month forwarded his estimates to the chief engineer, who paid plaintiffs monthly on the basis of such estimates, and they paid their subcontractors monthly on the same basis. After the completion of the work the chief engineer made a remeasurement thereof, when it was discovered that the assistant engineer's estimates, without the fault of plaintiffs or their subcontractors, were largely in excess as to quantities, the result being that the subcontractors had been greatly overpaid, The Federal Court holds that defendant, and not plaintiffs, must bear the loss; that, notwithstanding the terms of the contract, defendant was estopped to deny the correctness of the estimates of the assistant engineer whom it had placed in charge of the work. The clause of the contract making the chief engineer the final umpire in all differences between the parties under the contract relates only to the execution of the work, and has no application to such a question as this.[1]

Carriage of Goods and Injuries to Property.

The Supreme Court of Indiana holds that on a demand made for the delivery of goods, if the carrier denies having them, a tender of the freight charges is excused.[2]

In New York a contract was made between A. and a railroad company, whereby the former agreed to build a dock on the latter's lands, of prescribed character and size, each to use portions of it when constructed. In consideration, the company agreed to transport coal for A. at a specified rebate from the usual rates. It also agreed to provide him with certain coal-yards and offices for a term of years, after which the improvements were to be appraised, and the value paid to A. The Supreme Court holds that it could not be said, as matter of law, that the contract was void for unjust discrimination among shippers; whether in the particular case such discrimination was made being a question of fact.[3]

In Massachusetts the Supreme Judicial Court decides that a connecting carrier has a lien on goods of a perishable nature, delivered to and carried by it to a specified destination, for freight due it and unpaid, though the consignor had prepaid the freight demanded by the first carrier for the entire distance, under a contract for continuous and speedy carriage, the amount thus paid not being sufficient to cover the last carrier's charges; and it is not material whether the last carrier knew of such contract and prepayment of freight, as it could properly give precedence to the requirement for continuous and speedy carriage.[4]

In Indiana the Supreme Court rules that where bills of lading are silent as to the amount of freight to be paid, the law will imply that the compensation shall be reasonable, and such as is ordinarily charged for like services under like conditions, and, in the absence of fraud, concealment, or mistake, evidence of an oral agreement is inadmissible to control such implied provision.[5]

The Supreme Court of Iowa rules that under the state code providing that cities may permit or forbid the laying down of railroad tracks in streets, alleys, etc., but that no track shall be located and laid down until the injury to abutting owners has been ascertained and paid, a railroad company cannot lay a track in a street longitudinally without the consent of the city and compensation to the abutting owners. Where the junction of two streets is occupied by a diagonal railway crossing the abutting owner of a corner lot is entitled to damages.[6]

Injuries to Passengers, Employes, and Strangers.

In Iowa a man was injured by a collision while being carried as a passenger. The car in which he was riding was owned by a theatrical company, of which he was an employé, and was being used in the transportation of scenery. In one end of the car were bunks for persons to sleep, with bedding. The train consisted of passenger coaches and a baggage car, and the show car, which was placed between the baggage car and engine. He claimed that by the contract for the transportation of the car, and by virtue of his employment, he had a right to ride in the car. The contract was not given in evidence, and it was shown that he had charge of the property which was being carried, but it was not shown that it was his duty to ride in this car. He had a regular passenger's ticket, and he was informed by the conductor, when the ticket was taken up, that he must not ride in the car, as it was not a safe place, and was against the rules of the company. He replied that he did not want to go back in the passenger car, as he would have to get up too early (the car was to reach its destination about 2:30 a. m.) The Supreme Court reverses a verdict against the railroad on the ground that it was not sufficiently shown that defendent contracted to carry him in this car, nor that the conductor consented to his riding there.[7]

In Kansas the plaintiff, a woman about 52 years of age, arrived at the station-house before dark, intending to become a passenger, and purchased a ticket for that purpose. The station platform was about 3 ft. high, and there were steps at the west end, which she passed over in going from the ground to the platform. She remained at the station waiting for her train to arrive until after dark. The train was delayed, and it was not known when it would arrive. There were no water-closets or other like conveniences in or about the station-house, and it became necessary for her to retire from the station-house and from the platform. There was a public street at the west end of the platform, and she passed toward the east end. It was dark, and there were no artificial lights upon the platform or outside of the station-house, but there was sufficient natural light to enable her to see the platform, and to see the ground. When she arrived at the east end of the platform she saw the edge of the platform and saw the ground, and, believing that they were upon the same level, she attempted to step from the platform to the ground, but, the ground being about 3 ft. below, she lost her balance and fell the ground, causing an injury. The Supreme Court affirms a verdict against the company.[8]

In Iowa a bridge repairer withdrew from his work at the approach of a passenger train. As the train passed, a coupling-pin of iron was thrown by the wheel of a car, striking plaintiff. The workmen repairing the bridge testified that the pin could not have been thrown from the bridge, as the work they were doing on it required a close examination of it. The pin was such as is used upon cars having the Miller platform, which was on the cars in the train. It was not the kind of a pin defendant used on its cars, and a trainman, who made up the train, testified that he looked for a loose pin upon the platforms of the train before starting, and found none, though he might have overlooked it. Pins of various patterns are found upon cars exchanged from other roads. The Supreme Court holds that the jury were justified in finding that the pin was upon one of the platforms of the train and that the railroad is liable.[9]

In Illinois the Supreme Court rules that the act of a conductor of a street car, while collecting fares, in wrongfully ejecting a person therefrom, is within the general scope of his employment, and the company is liable for the damages, though the act was wanton and malicious.[10]

In Texas the plaintiff was run over or against by a locomotive hauling a freight train, and had his arm at elbow broken and fractured. He testified he was endeavoring to step off the track when he was struck by the engine. Defendant contends that he was drunk, lying with his head on the rail, and his arm near or on the rail, and his limbs extending outwardly from the road bed. The judge allowed, against defendant's objection, the jury to go from the court room to make an examination of a railroad engine. The Federal Court affirms a verdict against the railroad.[11]

The Supreme Court of Iowa rules that negligence in delaying an engine in a street for an unreasonable length of time is the approximate cause of an injury occurring by plaintiff's team becoming frightened while passing the engine, by steam escaping therefrom.[12]

In Minnesota a locomotive whistle frightened a team of horses which ran against a pedestrian and injured him. The Supreme Court rules that this shows a ground of action against the railroad.[13]

In Texas the plaintiff alleged that while he was walking on a railroad track in a certain street of a city, which street and track were commonly and necessarily used by the plaintiff and the public generally, the employés of the defendant detached cars from a train, and sent them, without signal or warning, on a down grade, in the direction of plaintiff, and that he was run over by the said cars without any fault or negligence on his part. The Supreme Court rules that this states a good case against the railroad.[14]

[1] Price v. C. S. F. & C. R. Co., 38 Fed Rep., 305.
[2] Adams Ex. Co. v. Harris, 21 N. E. Rep., 340.
[3] Root v. Long Island R. Co., 21 N. Y. Supp., 403.
[4] Crossan v. N. Y. & N. E. R. Co., 21 N. E. Rep., 367.
[5] L. E. & St. L. R. Co. v. Wilson, 21 N. E. Rep., 341.
[6] Enos v. C., St. P. & K. C. R. Co., 42 N. W. Rep., 575.
[7] Blake v. B. C. R. & N. R. Co., 42 N. W. Rep., 580.
[8] Mo. Pac. R. Co. v. Neiswanger, 21 Pac. Rep., 582.
[9] Dogle v. C., St. P. & K. C. R. Co., 42 N. W. Rep., 585.
[10] North City R. Co. v. Sastka, 21 N. E. Rep., 522.
[11] Owens v. Mo. Pac. R. Co., 38 Fed. Rep., 571.
[12] Andrews v. C. & N. W. R. Co., 42 N. W. Rep., 512.
[13] Dugan v. St. P. & D. R. Co., 42 N. W. Rep., 338.
[14] Lewis v. G. H. & S. A. R. Co., 11 S. W. R., 528.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Concord, 5 per cent., payable Nov. 1.
Cumberland Valley, quarterly, 2 per cent., payable Oct. 1.
Raleigh & Gaston, 3 per cent., payable Oct. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, special, Topeka, Kan., Nov. 7.
Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, Oct. 30.
Central Massachusetts, annual, Boston, Mass., Oct. 30.
East Tennessee, Virginia & Georgia, annual, Nov. 20.
Evansville & Terre Haute, annual, Evansville, Ind., Oct. 21.
Great Northwest Central, special, Ottawa, Oct. 21, to consider a proposed issue of bonds.
Knoxville Belt, special meeting at Knoxville, Tenn., Nov. 2, for the purpose of acting upon a proposed mortgage.
Lake Erie, Essex & Detroit River, special, Windsor, Ont., Oct. 29, to consider a proposed mortgage.
Manhattan, annual, New York City, Nov. 13.
New York, Lake Erie & Western, annual, 21 Cortlandt street, New York City, Nov. 26.
Ontario, Carbondale & Scranton, special, Scranton, Pa., to consider a proposed mortgage to secure an issue of $1,500,000 bonds.
Oregon & Transcontinental Co., special meeting, Portland, Or., Nov. 5, to take action on the question, which has already been submitted to the directors, whether the capital of the company shall be reduced or the company shall be liquidated and go out of existence.
Philadelphia, Germantown & Norristown, annual, Philadelphia, Pa., Nov. 4
St. Lawrence & Adirondack, special meeting, Salaberry, Que., Oct. 29.
Southwest Pennsylvania, special, Philadelphia, Pa., Nov. 14.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Association of Railway Station Agents* will hold its annual convention at Kansas City, Mo., Oct. 23.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p.m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will probably be held at the United States Hotel.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p.m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Civil Engineers.

At the regular meeting last Wednesday evening the paper read was on Cast Iron—Strength, Resilience, Tests and Specifications, by Prof. J. B. Johnson, of Washington University. Prof. Johnson has made and is still making elaborate tests to determine more precisely the physical properties of cast iron. Some intimation of this work was given in a paper published in the *Railroad Gazette* some weeks ago, describing his machine for cross-breaking tests. The paper read before the American Society is too long and too important to be hastily abstracted. In a later issue we shall give some of the results of the investigations. There was discussion by Mr. G. A. Just and Mr. Berg. Mr. Just explained some very interesting tests that he had recently made and showed specimens.

The Board of Directors has received from the Nominating Committee the following list of members selected by the committee as candidates for office for the ensuing year. The committee consists of Messrs. Stevenson Towle, O. E. Michaelis, Fred. H. Smith, Arthur Macy and J. F. Wallace; President, William P. Shinn; Vice-Presidents, Alphonse Fteley, Mendes Cohen; Secretary and Librarian, John Bogart; Treasurer, G. S. Greene, Jr.; Directors, Charles B. Brush, Theodore Voorhees, Robert Van Buren, William Ludlow, William G. Curtis.

Brotherhood of Section Foremen.

The fourth international convention of the Brotherhood of Railroad Section Foremen of America, was held in Chicago last week and elected the following grand officers: Grand Chief, James Sweeney, of East St. Louis, Ill.; Vice-Grand Chief, W. D Dempsey, of Epworth, Ia; Second Vice-Grand Chief, M. Fitzgerald, Evansville, Ind.; Grand Secretary and Treasurer, S. J. Pegg, of Montreal. The next convention will be held at Toledo, in October, 1890.

Engineers' Club of St. Louis.

A regular meeting was held Oct. 9, President Meier in the chair. Mr. H. M. Kebby was elected a member. Prof. Nipher was called to the chair and President Meier presented

a discussion of a new tractor recently invented by Mr. H. N. Van Zile, of Albany, N. Y. A model has been made, which easily mounted a 20 per cent. grade, while the same model, without the improvement, could only ascend a 10 per cent. grade. Mr. Robert Moore pointed out the similarity of this device to the Fell tractor.

Mr. C. H. Sharman read a paper on some reminiscences of the construction of the Union Pacific Railroad. Mr. Sharman entered the engineering department of this road in 1866 as a rodman, and remained until the completion of the road, when he held the position of Division Engineer.

PERSONAL.

—Mr. Albert Fink is still in Europe, and is undecided as yet whether to return to New York in November or to spend the winter in Italy.

—Mr. R. H. Scriven has resigned his position as Auditor of the Georgia Midland & Gulf road to accept a position on the Mexican National.

—Mr. Herman Silver, Treasurer of the California Southern and California Central roads, has resigned that position to become Receiver of the Los Angeles & Pacific.

—Mr. George W. Stevens, who recently resigned as Purchasing Agent of the Ohio & Mississippi to enter the employ of Fairbanks, Morse & Co., has again returned to the Ohio & Mississippi as Purchasing Agent.

—Mr. Henry B. Seaman, Member American Society Civil Engineers, has given up his position as Principal Assistant Engineer to Wilson Brothers & Co., of Philadelphia. His present address is Keystone Bank Building, Philadelphia.

—Mr. Edwin D. Wheelock, Auditor of the Cincinnati, Wabash & Michigan, has tendered his resignation. Mr. Wheelock has been Auditor of this road over four years, and was previously Assistant Cashier of the Lake Shore & Michigan Southern.

— Mr. E. L. Tyler, who recently resigned as Superintendent of the New Orleans & Northeastern Division of the Cincinnati Southern, has been appointed General Superintendent of Transportation of the Central of Georgia. This is a new office recently created.

—Mr. M. D. Flower, General Claim Agent of the Chicago, St. Paul & Kansas City, has resigned to accept the position of President of Union Stock Yards company. G. C. McMichael, has been Division Superintendent of the road at Des Moines, has been appointed to succeed Mr. Flower.

—Mr. Robert C. Ford, recently appointed General Manager of the Colorado Coal & Iron Co., died at Pueblo, Col., last week. Mr. Ford was formerly Superintendent of the Clearfield & Jefferson and Bells Gap road in Pennsylvania, which position he resigned to go to the Colorado Coal & Iron Co.

—Mr. Charles M. Schwab, Chief Assistant to the late Captain W. R. Jones, as Superintendent of the Homestead Steel Works, has been promoted to be General Superintendent of the Edgar Thomson Steel Works. Mr. John Potter, Assistant Superintendent at Homestead, has been made Superintendent of the Homestead Works.

— Sir Daniel Gooch, the English engineer, died Oct. 15. He was born in 1815, and learned his profession under Robert Stephenson. For many years he was Chief Locomotive Engineer of the Great Western Railway and Chairman of the Board of Directors. He was one of the original shareholders in the steamship "Great Eastern."

—Mr. Henry C. Wicker, Traffic Manager of the Chicago & Northwestern, has resigned, his personal business requiring his entire attention. Mr. Wicker has been with the Chicago & Northwestern continuously since 1873, serving as General Freight Agent for four years and as Freight Traffic Manager for five years. He has been Traffic Manager since 1884.

– Mr. D. J. Chase, General Superintendent of the Chicago Santa Fe & California since June, 1887, has resigned and has been succeeded by Mr. C. O. Wheeler, at present Division Superintendent of the Wisconsin Central. Mr. Chase has been successively Division Superintendent, Superintendent of Transportation and General Superintendent of the Atchison, Topeka & Santa Fe previous to his appointment as General Superintendent of the Chicago, Sante Fe & California.

—Mr. K. H. Wade, who was General Superintendent of the Wabash under the Receivership, and who resigned at the time of consolidation with the Wabash Western, has been appointed General Manager of the California lines of the Atchison, Topeka & Santa Fe. He succeeds Mr. Daniel McCool, who was appointed General Manager of the California Southern and California Central last February. Mr. McCool was formerly General Manager of the St. Joseph & Grand Island.

—Mr. T. Tandy, General Freight Agent of the Grand Trunk since Jan. 1, 1887, died suddenly in Montreal, Oct. 4, of heart disease, aged 41 years. He was born in London, and entered the service of the Grand Trunk in 1860 as a clerk in the general office, and he has since continued in the employ of the company or its operated lines. He was appointed Assistant General Freight Agent of the Great Western in 1876. He has since been General Freight Agent of the Detroit, Grand Haven & Milwaukee, and later also of the Great Western Division, Through Traffic Freight Agent of the Grand Trunk and General Freight Agent.

—Mr. M. J. C. Wrenne, Superintendent of the Nashville, Chattanooga & St. Louis, for the last eight years, has been appointed General Superintendent. Mr. Wrenne has been with this road since 1862, having entered the employ of the Nashville & Chattanooga at that time as a clerk in the transportation department. He was train master over 15 years. Several other important changes and promotions have been made on the road. Mr. Hunter McDonald, who has been with the road since 1878, recently as Assistant Engineer, has been made Superintendent at Fayetteville. Mr. M. Anderson, appointed Superintendent of the Jasper branch, has been with the road 30 years, serving as fireman and locomotive engineer. He has had charge of the Jasper branch three years. Mr. Edward Brown, appointed Superintendent of the Centreville branch, has had supervision of it for a number of years. He commenced as a locomotive engineer on the road 30 years ago.

ELECTIONS AND APPOINTMENTS.

Atlanta & Florida.—H. M. Powers, having resigned the position of Auditor of the road, W. E. Algee has been appointed to succeed him, with office in Atlanta, Ga.

Boston & Providence.—At the annual meeting of the company in Boston, Oct. 9, the Board of Directors was re-elected with the exception of John Lowell, who was chosen in place of Henry A. Whitney, deceased.

Central of Georgia.—The offices of General Superintendent of Transportation and Chief Engineer of Maintenance of Way have been created and E. L. Tyler appointed to the former.

Chicago, Muncie, Richmond & Cincinnati.—D. J. Mackey, Wm. Heilman, James L. Mackey, E. B. Morgan, W. J. Lewis, G. J. Grammer and Edwin Taylor are the directors of this company, just organized at Evansville, Ind.

Chicago, Rock Island & Pacific.—General Master Mechanic T. B. Twombly having resigned and asked to be relieved, George F. Wilson has been appointed Acting General Master Mechanic, pending action on such resignation.

Chicago, St. Paul & Kansas City.—G. C. McMichael has been appointed General Claim Agent, with office in St. Paul, Minn., to succeed M. D. Fowler, resigned to accept other service.

Cincinnati, Sandusky & Cleveland.—The annual meeting of the stockholders was held this week, and the following directors were re-elected: J. S. Farlow and N. W. Pierce, of Boston, and J. H. Thomas, of Springfield. The old officers were re-elected as follows: J. S. Farlow, President; Isaac Fenno, Vice-President, and J. L. Moore, Secretary and Treasurer and General Manager; A. P. Simpson, Assistant Treasurer and Agent at Boston.

Cleveland, Akron & Columbus.—A. W. Dunning has been appointed Secretary, Auditor and Treasurer, in place of C. W. Schaap, resigned.

Colorado Short Line.—The following are the incorporators of this Colorado Company: S. L. Smith, General Manager; Andrew S. Hughes, General Freight Agent, and David H. Moffat, President, of the Denver Grande; S. N. Wood, Senator E. O. Wolcot and Roswell E. Brigg, of Denver.

Columbus & Cincinnati Midland.—O. P. McCarthy has been appointed General Passenger Agent of the road, with headquarters at Columbus, O. Mr. McCarthy has been Assistant General Passenger Agent of the Baltimore & Ohio.

Consolidated Rolling Stock Co.—At the annual meeting of the stockholders at Bridgeport, Conn., this week, the following board of directors was elected: Walter H. Wesson, Springfield, Mass.; H. K. Ritchie, Montreal; B. S. Johnson, Hudson, N. Y.; Daniel N. Morgan, W. E. Seelye, James Staples, David Trubee, H. C. Coggswell and T. B. Deforest, Bridgeport. At a subsequent meeting of the directors the following officers were elected: President, James Staples; Vice-President, D. N. Morgan; Treasurer, W. E. Seelye; Secretary, Edward Deacon.

Duluth, South Shore & Atlantic.—Charles Wilkins, of Ashland, Wis., has been appointed Auditor, with office at Marquette, Mich.

East Line & Red River.—At the annual meeting of the company held in Jefferson, Tex., Oct. 8, the following were elected directors: W. H. Abrams, John Bacon, F. H. Pendergrass, Edwin Gould, J. A. Baker, R. C. Foster, E. Boyce, D. S. Smith, E. A. Taylor. R. C. Foster was elected President, E. A. Taylor Vice-President, E. A. Boyce Secretary and Treasurer, E. A. Taylor Assistant Secretary.

Erie & Black Rock.—The stockholders have elected directors for the ensuing year as follows: Rufus L. Howard, Henry W. Sprague, George S. Field, John King, Augustus R. Macdonough, George W. Quintard and Samuel M. Felton, Jr.

Eutawville.—S. G. Brownson has been appointed General Manager of the road, with headquarters at Sumter, S. C.

Evansville & Terre Haute.—Geo. Howard, Master of Transportation, has resigned, and Geo. L. Hurst appointed to succeed him, with office in Evansville, Ind.

Fort Wayne, Cincinnati & Louisville.—William B. McPhail has been appointed Master Mechanic, vice T. H. Haberkorn, resigned.

Thomas C. Peck has been appointed Traveling Freight and Passenger Agent, and Wallace McGowan Contracting Agent for freight and passenger departments, with office at Cincinnati.

Georgetown, Silver Creek & Chicago Lakes.—The following were elected officers at a recent meeting: President, George W. Hall; Vice-President, Charles R. Fish; Secretary, Robert O. Old; Treasurer, George A. Mills; Engineer, Frank A. Maxwell; Attorney, Jacob Filliu.

Grand Trunk.—Foreign Freight Agent Moore, of Detroit, succeeds the late Thomas Tandy as General Freight Agent at Montreal.

Hannibal & St. Joseph.—H. S. Gray has been appointed Assistant General Freight Agent of the Hannibal & St. Joseph and the Kansas City, St. Joseph & Council Bluffs roads.

Huron, Chamberlain & Black Hills.—The following are the officers of the company: D. H. Henry, President, Chamberlain, S. D.; F. E. Stevens, Vice-President, Huron, S. D.; L. N. Loomis, Secretary, Alpena, S. D.; J. H. Stearns, Treasurer, Chamberlain, S. D., and E. T. Hannistion, Chief Engineer, Alpena.

Hutchinson & Southern.—The directors of the consolidated company are as follows: A. L. Williams and H. P. Dillon, Topeka; Charles Collins and G. A. Wulkup, Hutchinson, Kan.; George L. Rhodes, E. F. Wise, George W. Booth, D. B. Hall and H. A. Christy, Chicago. The officers chosen are: A. L. Williams, President; G. A. Wulkup, Vice-President; E. E. Wise, Treasurer; George W. Booth, Secretary. The chief office is at Hutchinson.

Idaho Springs, Spring Gulch & Chicago Creek.—The company has been incorporated in Colorado by F. F. Osbiston, W. A. Hamill, Thomas Cornish, Samuel Strausse and H. C. Hamill.

International & Great Northern.—H. B. Kane having resigned, T. N. Jones has been appointed General Claim Agent for the receivers of the railroad, with office at Tyler, Tex.

Kansas City, Arkansas & New Orleans.—The following are now the officers of this road: Adolph Cudell, President; George M. Barbour, Secretary, and Edmund Lehmann, Treasurer, 226 La Salle street, Chicago; T. H. Leslie, Land Commissioner, Stuttgart, Ark., and George D. Foster, Chief Engineer, Beebe, Ark. C. H. Stoddart is Financial Agent, at 18 Broadway, New York.

Kennebec Central.—The company has organized by the choice of Weston Lewis, President; P. H. Winslow, Treasurer; H. S. Webster, Clerk; A. C. Stilphen, Auditor. The board of directors are: Weston Lewis, Hartley W. Jewett, Eben D. Haley, Sanford N. Maxcy, A. C. Stilphen, J. B. Dingley, Josiah S. Maxcy and David Dennis.

Lake Superior Terminal & Transfer.—The annual meeting of the company was held at Hudson, Wis., last week. The election of directors and officers resulted as follows: Directors: E. W. Winter, E. L. Dudley, A. L. Mohler, H. D. Minot, W. S. Mellen and J. H. Hammond. Officers: President, E. W. Winters; Vice-President, E. L. Dudley; Secretary and Treasurer, D. A. McKinley.

Los Angeles & Pacific.—Herman Silver has been appointed Receiver of the road, to succeed W. T. Spillman.

Louisville & Nashville.—At the recent annual meeting in Louisville the old Board of Directors was re-elected, with one exception, Jacob B. Scheff, of New York, in the place of T. W. Todd, of New York, deceased.

Manchester & Portsmouth.—The annual meeting of stockholders of the road was held in Manchester, N. H., recently. The following were elected directors: John J. Pickering, Portsmouth; James B. Walker, Concord; Moody Currier, Manchester; W. M. Parker, Manchester; W. A. Pierce, Portsmouth; John J. Bell, Exeter; William H. Hackett, Portsmouth; President, John J. Pickering; Clerk, W. Hackett.

Maysville & Big Sandy.—At the annual meeting of the stockholders in Maysville, Ky., last week, the old board of directors and officers were re-elected.

Nashville, Chattanooga & St. Louis.—J. W. Thomas has been appointed Assistant General Manager of the road, with office at Nashville, Tenn.

The following appointments have also been made: M. J. C. Wrenne, General Superintendent; Hunter McDonald, Superintendent of the line between Decherd, Columbia and Huntsville, with headquarters at Fayetteville, Tenn.; M. Anderson, Superintendent of the Jasper branch, with office at Jasper, Tenn.; Edward Brown, Superintendent of the Centreville branch, with headquarters at Dickson, Tenn.

New Brunswick.—The adjourned annual meeting of the company was held in St. John, N. B., last week, and the following directors were elected: Sir Donal Smith, Sir George Stephen, Robert M. Meighen, of Montreal; E. R. Burpee, of Bangor; C. W. Weldon, M. P., John McMillan, of St. John; Samuel Thorne, J. Kennedy Tod, D. Willis James, H. A. Northcote and John S. Kennedy, of New York. At a subsequent meeting of the directors, Sir George Stephen was elected President, and J. Kennedy Tod, of New York, Vice-President; F. W. Cram, Bangor, General Manager; Alfred Seely, Secretary and Treasurer.

Niobrara & Sioux Reservation.—The incorporators of this Nebraska company are: F. P. Bonnell, Charles H. Swigard, A. Beal, John M. McElkiney and J. H. Kesterson.

Owensboro, Falls of Rough & Green River.—R. H. Rudd has been appointed General Freight and Passenger Agent of the road, with office at Owensboro, Ky.

Pittsburgh & Western.—J. H. Klein has been appointed Assistant Superintendent of the Western and Lake divisions of the system, and L. Thomas, Trainmaster of the Eastern Division.

Richmond & Chesapeake.—The annual meeting of the stockholders of the company was held in Richmond, Va., Oct. 10, and the following officers were elected: Charles W. Mackay, President; Charles E. Belvin, Vice-President; M. B. Portiaux, Secretary; H. R. Baltzer, Treasurer. Directors: Charles W. Mackay, Charles E. Belvin, H. B. Fry, Louis F. Bossieux, and Willis A. Barnes. All the officers are of New York, except C. E. Belvin.

St. Joseph & Grand Island.—The position of General Roadmaster and Master of Transportation have been abolished. Mr. Williams has been appointed Superintendent, and as such will discharge the duties of General Roadmaster and Master of Transportation, with office at St. Joseph, Mo. E. B. McNeil has been appointed Assistant Superintendent, and his duties will be limited to the Kansas City & Omaha, with office in Fairbury, Neb. Stuart Clark has been appointed Division Roadmaster, in charge of the Eastern Division, with office at Marysville, Kan. P. Devereaux has been appointed Division Roadmaster, in charge of the Western Division, with office at Fairfield, Neb. James Clark has been appointed Division Roadmaster, in charge of the Kansas City & Omaha, with office at Fairfield, Neb.

Selma & Bessemer.—The incorporators of this Alabama company are: H. L. McKee, E. S. Sarr, L. H. Montgomery, J. W. Stillwell, A. W. Cawthon, R. M. Nelson and H. S. D. Mallory, all of Selma. The following board of directors has been elected: H. L. McKee, A. W. Cawthon, B. S. Bibb, H. S. D. Mallory, Sol. Kohn, I. Alex. Schwartz and R. M. Nelson.

Sioux Falls & Denver.—The directors at a recent meeting elected the following officers: President, Col. James H. Drake, of St. Paul; Vice-President, M. Gillens, of Dubuque, Iowa, Superintendent Illinois Central; General Manager, J. L. Turner, Roadmaster Illinois Central; General Traffic Manager, L. Backus; Secretary and Treasurer, C. O. Bailey.

Troy & Boston.—S. B. Sanford, of Troy, N. Y., has been elected President of the company in the place of the late Daniel Robinson.

Western Maryland.—The annual meeting of the stockholders was held in Baltimore, Oct. 16. The present stockholder directors were re-elected. The Baltimore City Council held no joint convention of the two branches, and so have not yet acted on the Mayor's eight appointments for city directors.

Wickford Railroad & Steamboat Co.—At the annual meeting of the company, held in Newport, R. I., Oct. 7, George M. Miller was elected President and A. S. Sherman, Secretary and Treasurer. Directors elected are: G. M. Miller, John N. A. Griswold and David King, of New York; ex-Gov. G. P. Wetmore and John G. Weaver, of Newport, and C. H. Vaughn, of Wickford.

OLD AND NEW ROADS.

Albert.—The English shareholders of this company have made arrangements to take over the road in accordance with a contract recently entered into with Dr Griffith. It will be remembered that the road was bid in at the sale held under decree of Equity Court by the representatives of the English bondholders. The syndicate will make a change in the management, Mr. J. E. G. Jones, the present manager, retiring. The road extends from Salisbury to Harvey, N. B., 48 miles.

Atlanta, Asheville & Baltimore.—The New England Supply Co. has agreed to build this road from a point between Atlanta and Asheville, N. C., through Asheville to Boone, N. C., where connection will be made with the Norfolk & Western for Roanoke, Va. The survey will soon begin. N. Atkinson, of Asheville, is President; W. H. Inloes, also of Asheville, is a director.

Atchison Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals) and net earnings of the road for August, 1889, were as follows:

	Gross earnings.	Operating expenses.	Oper. mile-age.	Net earn'gs.
A., T. & S. F. and Leased lines (including Chicago Line, St. J., C., K. & W., N. M. & A., and Sonora)..	$1,906,972	$1,178,177	4,934	$728,975
St. L., K. C. & Col.....	8,679	5,099	61	3,580
G., Col. & S. Fe.....	333,430	237,123	1,058	86,307
Cal. Central.....	80,952	65,579	265	15,373
Cal. Southern.....	52,640	46,835	211	5,805
Total.....	$2,382,673	$1,542,813	6,529	$839,860
Roads jointly owned with other compans.				
Atch. Co.'s one-half.....	109,778	108,182	583	1,596
Grand total.....	$2,492,451	$1,650,995	7,112	$841,456

The comparative statement of all lines is as follows:

	Gross earn.	Net earn.	Mile-age.	Per mile. Gross earn.	Per mile. Net earn.
August, 1889.....	$2,492,451	$841,456	7,112	$351	$118
August, 1888.....	2,393,834	576,059	7,009	342	82
Inc. Aug., 1889..	$98,617	$265,397	102	$9	$36

Baltimore & Drum Point.—The Anne Arundel County Commissioners have refused to pay the first quarterly installment of $50,000 of the $200,000 subscription to this road. The railroad authorities will endeavor to obtain a mandamus to compel the board to recognize the subscription adopted by a former board; meanwhile the work on the road will go on. The $200,000 is part of $452,000 to be subscribed, of which the State gives $152,000 and Calvert County $100,000. The sum from Calvert County is already held in trust in Baltimore for the company.

Baltimore & Ohio.—The regular monthly meeting of the Board of Directors of the company took place Oct. 16. The following is the statement of the earnings and expenses for September, 1889 (approximated), compared with September, 1888: Earnings, 1888, $1,764,684, and 1889, $2,037,265, an increase of $272,581; expenses, 1888, $1,176,737, and, 1889, $1,234,448, an increase of $57,711; net, 1888, $587,947, and 1889, $802,817, an increase of $214,870. The earnings and expenses for the twelve months of the fiscal year 1888-9, compared with the same months of the fiscal year 1887-8 (September, 1889, approximated) were as follows: Earnings, 1888, $20,353,492, and 1889 $21,271,340, an increase of $917,848; expenses, 1888, $14,200,561, and 1889, $14,789,922, an increase of $589,361; net, 1888, $6,152,931, and 1889, $6,481,418, an increase of $328,487.

A dividend of 5 per cent. was declared on the stock of the Washington branch for the six months ended Sept. 30. The board adopted the recommendation of the Finance Committee that it was inexpedient to declare a dividend on the common stock of the company for the six months ended Sept. 30, 1889.

It is stated that the Chief Engineer has recommended that the company extend the Shenandoah Valley branch, from Lexington to Roanoke, Va., to take advantage of Southern connections at that point.

Bellefonte & Eastern.—A large force of men is working on this road, which is to extend from Bellefonte through Nittany, Sugar and White Deer valleys to Watsontown, Pa., a distance of about 75 miles.

Brantford, Waterloo & Lake Erie.—Engineers are out making a survey of the proposed extension of this line to connect with the Toronto & Welland road. Much difficulty has been experienced in locating the line through the suburbs of Hamilton, Ont., but the difficulties have been surmounted, and the line, as located, will enter Hamilton midway between the Grand Trunk station and the Royal Hotel. The line will run about two miles south of Dundas.

Burlington & Missouri River.—The extension from Alliance, Neb., to the Wyoming coal fields, near the Black Hills, has been opened for regular passenger and freight service to Crawford, Neb., 65 miles northeast of Alliance, where connection is made with the Fremont, Elkhorn & Missouri Valley. The line will be opened to the Black Hills probably by Nov. 15.

California Southern.—The directors of the California Southern, California Central and Redondo Beach Railroads have ratified the action of the directors of the Atchison, Topeka & Santa Fe in voting to consolidate these three lines, which are controlled and operated by the Atchison, Topeka & Santa Fe.

Canadian Pacific.—The company has recently made an issue, at 90, of four per cent. debenture bonds in London, sufficient to take up $3,240,000 of guaranteed five per cent. preferred stock of the Atlantic & Northwest Railroad, and to provide for the construction of the Mission branch, in British Columbia, to complete connection with Seattle and other Pacific coast points.

Alexander Livingston is said to have been awarded a contract for rebuilding masonry between Port Arthur, Ont., and Rat Portage; also for considerable rock cutting to straighten the line between these points materially and shorten the route from the west to the head of navigation.

A. T. Reid and D. A. Stewart are exploring the country in the southeastern part of British Columbia, from North Arm, B. C., through Landeau Pass, to Kootenay Lake, thence down the lake to Sproat's Landing. Here the party divides, one section under A. F. Stewart, with pack animals and heavy material, going south to Colville, Wash., and thence over the old trail to Okanagan Valley, in British Columbia. The other section, in charge of D. A. Stewart, will try first to find the headwaters of the Slocan River. The Mosquito Creek, which runs into the Columbia River from the northwest, at the Narrows, between the Arrow lakes, will also be investigated for the purpose of finding a feasible pass across the gold range to the sources of Cherry Creek and thence into the Okanagan and Spallumchien valleys.

Canning & Kingsport.—Work on this Nova Scotia line is being pushed rapidly ahead, connection having been made with the Windsor & Annapolis, and rails laid to the Cornwallis River, where one abutment for the bridge is nearly completed.

Chicago & Alton.—It is reported that the line from St. Louis to Alton, 21 miles, is to be double tracked, to afford better facilities for the large suburban traffic.

Chicago, Muncie, Richmond & Cincinnati.—This company has been incorporated in Indiana to build a line from a point on the Cincinnati, Wabash & Michigan between Jonesboro and Fairmont, in Grant County, to Cincinnati, making about 30 miles, the shortest route between Cincinnati and Chicago, and by the extension of the Louisville, Evansville & St. Louis road to Harrison or Cincinnati, a very short line between St. Louis and Cincinnati. The capital stock is $1,000,000.

Chicago, St. Paul, Minneapolis & Omaha.—The Secretary of the Interior has directed the Commissioner of the General Land Office to correct certain errors made in the adjustment of the land grant to the state of Wisconsin for the benefit of this company. By this decision the company gets 7,795 acres of indemnity land for swamp land heretofore erroneously transferred to it, which in fact, belonged to the state; also 3,622 acres, on account of an error in a former statement made by the General Land Office; also 1,260 acres, on account of lands erroneously sold by the United States; also 6,558 acres, on account of lands erroneously certified as indemnity, which were in fact granted lands. The Secretary further decides that the road is entitled to its lands by grant, under both the acts of 1856 and of 1864. This ruling will give the road additional indemnity to the amount of about 37,000 acres.

Cleveland, St. Louis & Kansas City.—The Missouri River Construction Co., of New Jersey, has been organized to complete this road and will probably soon start work again. Rails have been ordered and will soon arrive. The track between St. Charles, Mo., and Matsens, six miles, will be laid first, and as soon as the rails can be obtained the track will be put down between St. Charles and Alton. Work will be resumed on the Alton bridge within a few days.

Colorado Short Line.—This company, whose incorporation was referred to last week, has been chartered to build a road from a point on the Denver & Rio Grande road near the Arapahoe County line between Littleton and Acquia, thence southwesterly up the Platte River to Lidderdall, on the Colorado Midland road in Park County, thence west and southwest to a point on the Denver & Rio Grande road in Chaffee County, near Buena Vista, thence west to Grand Junction in Mesa County to Salt Lake City, Utah, and through Utah and Nevada to Elko, on the Central Pacific road. It is understood that work on the Colorado portion of the line will commence as soon as contracts can be let.

Columbus Southern.—About a mile of track is being laid each day, about 24 miles being now completed from Columbus, Ga. The line will soon be finished to Richmond, and it is believed the company will then open the completed section for freight and passenger service. About 1,000 men are at work between Columbus and Albany, 87 miles, and tracklaying will be completed by Feb. 1.

Dallas, Pacific & Southeastern.—Nearly the entire grading has been completed on the 72 miles from Dallas northeast through Grapevine and Roanoke to Rhome, Tex. The company has been unable to procure the delivery of rails before Dec. 15, but tracklaying will commence as soon as the rails arrive.

Decatur, Chesapeake & New Orleans.—The County Court of Lincoln County, Tenn., has decided to issue $150,000 in bonds to the company, the road having been completed through Lincoln County.

Delaware & North River.—The survey for this road is now nearly completed from Ellenville, N. Y., near Summitville, northeast to Kingston, about 40 miles. Near Kingston a survey is being made from High Falls south to Rosendale, from which point it is proposed to use the tracks of the Walkill Valley road to Springtown, and then build three miles to a connection with the Hudson connecting road.

Delaware & Otsego.—This company has agreed to extend its road, now building, to Oneonta, N. Y., if that city will subscribe for $25,000 of its stock and give free right of way. Thomas Cornell, of Rondout, N. Y., is the President.

Denver & Rio Grande.—About 300 men are now grading the Pike's Peak & Manitou road near the summit, and it is expected to complete the work to the timber line before winter sets in. The grade will be about 1 320 ft. to the mile (25 per cent.) There will be no subcontracts, the entire work being done by B. Lantry & Sons, of Denver. It is proposed to change the location at the foot of the mountain so as to enter Manitou by a different route.

Georgia.—The Union Point & White Plains road recently completed, was opened last week for traffic between Union Point and White Plains, Ga., 13 miles, with much speech-making and other ceremonies, which were attended by Gov. Gordon, of Georgia, and other distinguished guests. The road is operated by the above company.

Grand Trunk.—This company has commenced a survey from Waterloo Junction to Elmira, Ont., which it is expected will be completed and the right of way purchased this fall and work of construction begun early in the spring. Extensive improvements are to be commenced at Napanee this month. The heavy grade east of the town will be reduced 12 ft. for the purpose of laying a double track. The bridge at that point is also to be widened. The Railway Committee of the Canadian Privy Council has granted the application of the company to be permitted to build a branch line from Campbellford, Ont., to Burk's Mills, 2½ miles. The application to build a loop line around Hamilton, Ont., in order to save a distance of three miles and avoid sending east-bound freight over the crowded lines of the city was denied.

Gurleys & Paint Rock.—This company has been chartered in Alabama to build a road from the Alabama state line, in Jackson County, down the Paint Rock Valley to Guntersville, on the Tennessee River. The capital stock is $100,000.

Hants Central.—Mr. Ketchem, C. E., projector of the Chignecto Ship Railway, has just completed a survey of this road in the interests of English capitalists. The crossing of the Shubenacadie River, Nova Scotia, he says, necessitates the erection of a bridge 3,000 ft. long, composed of 11 spans of 200 ft. each, in addition to a large pivot span. The piers upon which it will rest will require to be 50 ft. high. The cost of the bridge alone is estimated at $500,000.

Hot Springs.—This road, extending from Malvern, Ark., on the line of the St. Louis, Iron Mountain & Southern, to Hot Springs, 25 miles, was changed on Wednesday from narrow to standard gauge. The change was made in three hours.

Huron, Chamberlain & Black Hills.—All the right of way for this road has been secured, and it is expected to let contracts for grading next spring. The survey has just been completed. The road is to extend from Huron via Alpena, to Chamberlain, S. D., about 80 miles. The work is very light, the maximum grade being 35 ft.

Idaho Springs, Spring Gulch & Chicago Creek.—This company has been incorporated in Colorado by F. F. Osbiston, W. A. Hamill, Thomas Cornish, Samuel Strausse and H. C. Hamill to build a road from Idaho Springs to a point near Lamartine mine, connecting with the Georgetown, Silver Creek & Chicago Lakes road, all within Clear Creek County. The capital stock is fixed at $50,000. Principal offices at Idaho Springs.

Inter-state Consolidated Rapid Transit.—This company, operating an elevated line in Kansas City, has been placed in the hands of a Receiver. This action was taken at the application of the Metropolitan Trust Co., of New York, which holds $800,090 of the company's bonds, upon which it has been unable to pay the interest. The total indebtedness of the road is placed at $1,000,000.

Iowa & Nebraska.—The company has filed articles of incorporation at Des Moines, Ia., to build a line from a point on the Mississippi River, within the state of Iowa, by way of Des Moines, Red Oak and Nebraska City to Lincoln Neb. The capital stock is $10,000,000.

Kansas City, Arkansas & New Orleans.—The Chicago & Arkansas Railway Construction Co. has the contract for building the Arkansas Division of this road, which is to extend from Springfield, Mo., through Beebe, Ark., and across the Arkansas River at Cummins Landing on a steel bridge, 950 ft. long, with a draw 19 ft long, thence via Hamburg and Monticello, Ark., and Bastrop, Monroe and Columbia to Cheneyville and Morgan City, La. The Chicago & Arkansas Railway Construction Co. is now organizing its forces and will soon begin grading, probably at Stuttgart, which is on the St. Louis, Arkansas & Texas, near Pine Bluff, Ark. It is expected to have 228 miles between Beebe, Ark., and Monroe, La., and the branch to Pine Bluff completed in 11 months. From Beebe south the grade will be practically level, nowhere exceeding 9 ft. in 1,000. The roadbed will be about 30 feet above the overflow of river floods. The line traverses the length of the famous cotton belt region, and also the Bartholomew timber region of pine, oak and black walnut. The preliminary funds have been provided by wealthy Germans of Chicago. The capital stock of the company is $5,000,000, and the bonds amount to $4,000,000 at six per cent. for 40 years on the Arkansas Division.

Kentucky Union.—Grading and tracklaying on this road are now proceeding rapidly, and it is expected to have the road completed to Lexington, Ky., by Dec. 1. The trains will enter the city over the tracks of the Belt Railroad, now being built at Lexington.

Lake Shore.—This line is now completed from Lake Village north to Alton Bay, N. H., 16 miles, with the exception of three miles, but this will probably be finished this week. The Concord & Montreal Railroad will operate it as part of its system.

Louisville, New Albany & Chicago.—The company has made an arrangement with the Lake Erie & Western and Cleveland, Cincinnati, Chicago & St. Louis, by which it secures the use of the joint tracks of these latter roads from Massachusetts avenue, Indianapolis, to a connection with the track of the Indianapolis Union road at East Washington street. The company has recently completed five miles of new road from Howlands to Massachusetts avenue to give it a new entrance to the city. It is said that ground is being secured for a new freight station in Indianapolis.

Macon & Birmingham.—The bids were awarded this week for grading and tracklaying on the first 65 miles of this road from Macon, Ga., west to a connection with the Georgia Midland & Gulf, the work to be completed in six months. Bids were also received for the remaining 150 miles to Birmingham. The road is being built by the Macon Construction Co., of Macon, Ga., which is also building the Georgia Southern & Florida.

Manitoba & Southeastern.—The contract for grading 30 miles of this road, which will run from Winnipeg to the international boundary line, has been awarded to Sinclair & Flannigan. It is understood that the Grand Trunk is one of the companies with which this road will connect at the boundary.

Marietta & North Georgia.—The company recently petitioned the Georgia Legislature in separate bills for special charters changing the name of the road from the Marietta & North Georgia Railroad to the Marietta & North Georgia Railway, authorizing an extension to Knoxville, Tenn., and also from Marietta south to Atlanta, Ga. The two former bills were passed, but the last met with considerable opposition, as the proposed line would parallel the Western & Atlantic, which is owned by the state, for many miles. The House of Repretentatives and Senate voted last week, however, by a small majority to grant the company the special legislation asked for.

McKeesport & Belle Vernon.—The formal opening of this road from McKeesport to Belle Vernon, Pa., 28 miles, occurred Oct. 10 The event was celebrated at Belle Vernon with elaborate ceremonies, attended by nearly 3,000 people.

Mexican Southern.—The first 140 miles of this line is now under construction, and all sub-contracts let to Tecomavaca. Read & Campbell, of the city of Mexico, are the general contractors. No other sub-contracts will be let at present, but next year further contracts for grading and tracklaying will be let. The route is from Puebla to Tehuacan, to Tecomavaca and to Oaxaca. This is the terminus of the first contract, but the road is ultimately projected to Tehuantepec. The character of the work to be done is difficult. The minimum curves on the first contract are 100 metres radius. The maximum grade to Tecomavaca is 2 per cent., and between Tecomavaca and Oaxaca 4 per cent. The surveys of this latter, however, are not yet finished. The number of men working at present is 1,000, but during next month it is hoped to have 2,000 men and 150 scrapers at work. The contractors are working at five different places. The whole of the bridges throughout the contract will be constructed of iron, the total number being 24 and the total length 543 metres. There are two tunnels, total length being 160 metres. The orders for rolling stock are being given out in England. It is the intention to buy a certain quantity very shortly in the United States. The capital of the first 140 miles consists of £600 000 six per cent. mortgage debenture stock, and £500,000 seven per cent. cumulative preference; £500,000 in ordinary shares of £10 each. The contract of Read & Campbell includes equipment, stations and the building of the road, and they are paid in equal proportions of debenture, preference or ordinary shares, as the road is completed, upon the certificate of the Chief Engineers, James Livesey & Son, Broad Street avenue, London, Eng.

Missouri Pacific.—Last year the Jefferson City, Boonville & Lexington branch was built from Lexington to Boonville, Mo., 79 miles, and it was then intended to continue the branch southeasterly from Boonville to Jefferson City, about 40 miles distant, but no work was done beyond Boonville. The company recently asked an extension of the grant of right of way through Boonville, and it is stated that the president on his recent inspection authorized the construction of the line between Boonville and Jefferson City. It is thought that the work will commence very soon. When the line is finished to Jefferson City, the Missouri Pacific will have the shortest line between St. Louis and Kansas City.

Mount Pleasant & Seaview.—This road is being surveyed through Mount Pleasant, S. C., near Charleston. The road is to extend from Mount Pleasant and Hog Island to Sullivan's Island and Seaview City and will be about eight miles long.

New Roads.—A company, capitalized at $75,000, has been organized at Decatur, Ala., to build a belt railroad. Work will probably begin in a few days, and be pushed to rapid completion.

Articles of incorporation will soon be filed in Indiana for a road to begin at Island City, Green County, and extend through Linton, Dugger and Brazil to Bainbridge, where connection will be made with the Louisville, New Albany & Chicago. The line will be 75 miles long, and 45 of it passes over coal-beds.

Niobrara & Sioux Reservation.—This company has been incorporated in Nebraska to build a road from a point in township 27, range 5, in Antelope County, through the county, and thence through Knox County to the north boundary line of the state. The capital stock is $700,000.

Norfolk & Western.—It is stated that the Saltville branch, at present eight miles long, is to be extended from Saltville, Va., up the Rich Valley, to reach valuable plaster fields.

Ohio, Indiana & Western.—Engineers of the Cleveland, Cincinnati, Chicago & St. Louis are now surveying a line from Springfield east to Columbus, O., about 45 miles. This line would parallel the Columbus & Springfield Division of the Cincinnati, Sandusky & Cleveland. The company endeavored to secure a lease of the latter, but was unable to make satisfactory agreement with the latter company, and it now threatens to build an independent line unless a satisfactory agreement can be made.

Ontario, Carbondale & Scranton.—At a special meeting to be held at Scranton, Nov. 4, the stockholders will vote on a plan to issue $1,500,000 of bonds and execute a mortgage on the road to secure them.

Oregon Railway & Navigation Co.—The Washington & Idaho road was completed last week from Rockford to Spokane Falls, Wash., 27 miles. This opens another line from the East to eastern Washington. The new line is via the Union Pacific, Oregon Short Line and the Oregon Railway & Navigation Co.'s lines.

Oregon Pacific.—Orman & Crook, of Pueblo, Colo. have been awarded a contract for building nearly 100 miles of this road, and have shipped their outfit to Albany, Or. Work is to be commenced at once at the present terminus and continued easterly.

Paducah & Tennessee.—Major Olcott, Chief Engineer, has started from Paducah, Ky., with a party of engineers, to resume the location of the line to the Alabama State line, from the end of the former survey. It is stated that the sub-contractors will commence work at Paducah in a few weeks.

Pennsylvania, Lehigh & Eastern—The company has drawn a mortgage for $5,000,000 to the New York Security & Trust Co., to secure the payment of a like amount of 5 per cent. bonds, issued to build the road from Tomhicken, Luzerne County, to Matamoras, Pa. Samuel F. Pierson is President, and S. W. Newberger, of New York, is Secretary.

Port Arthur, Duluth & Western.—About 12 miles of grading has been completed from Port Arthur, and the work will probably reach Kaministiqua, Ont., a distance of 21 miles, before Dec. 1. Nearly 1,800 tons of steel rails have arrived, as well as the first installment of locomotives and freight cars.

Portland & Ogdensburg—The case of the Lincoln National Bank, of Bath, Me., et al., in equity against the road has been decided by the Supreme Court. When the mortgage on the road was foreclosed and the new corporation was formed 24,840 shares of the new stock was issued to the city of Portland, Me. Minority bondholders claimed that 2,825 of these shares were illegally issued, and petitioned the court to restrain the issue of the same. The decision of the court sustains a part of the issue amounting to $155,610, and restrains the issue of the remainder, amounting to $127,890.

Poughkeepsie & Southeastern.—This road has been surveyed from the Poughkeepsie terminus of the New York & Massachusetts Railroad, with which company it has a contract for terminal privileges, in a northeasterly direction through the town of Poughkeepsie and the towns of La Grange, Wappinger and East Fishkill, to a connection with the Newburg, Duchess & Connecticut and New York & New England roads at Hopewell Junction. It is 11 miles in length, and construction is to begin in a few days, or as soon as the necessary right of way, which is now being negotiated for, can be secured. The work is generally light, with a maximum grade of 52.8 ft. per mile and 6 deg. curves at the two termini. Seven iron bridges, from 25 to 80 ft. span, and one trestle about 275 ft. long and 30 ft. high, will be built. E. S. Bowen, of Poughkeepsie, is General Manager.

Red River, Sabine & Western.—The road has been completed for 10 miles east of Nacogdoches, Tex., and about 75 teams are working on the rest of the line to San Augustine. Work has not yet begun on the Western division between Palestine and Nacogdoches, but it is expected that it will be commenced as soon as the grading is finished to San Augustine.

Richmond, Fredericksburg & Potomac.—This company and the Richmond & Petersburg early last spring began work on a belt line, eight miles long, around Richmond, Va., to connect the two lines. Little progress has since been made, and work is now at a stand still, as the company has been met by exorbitant demands for the right of way and by injunctions being secured in many cases to prevent further construction. It is now understood that the state legislature will be asked at its next session to grant the companies authority to build the proposed line, but if this is done the companies may be asked to surrender their chartered rights of exemption from taxation.

Rio Grande Junction.—Corey Bros. & Co., of Ogden, Utah, have received the contract for grading this road, which is being built by the Colorado Midland and Denver & Rio Grande roads. The line commences at Rifle Creek, the present western terminus of the Denver & Rio Grande, and terminates at Grand Junction, where it will connect with the Rio Grande Western, and is 63 miles long. The work is not heavy for mountain work; the maximum grade is one per cent., maximum curvature seven degrees. There will be 1,000 ft. of tunnel on the line, but no iron bridges. The construction work is to be managed jointly by the officers of the Denver & Rio Grande and Colorado Midland, and B. H. Bryant of the former line and R. S. Briggs of the latter are the Chief Engineers.

St. Louis & Chicago.—Major Bluford Wilson, Special Commissioner, last week sold this road under the order of the Federal Court at Springfield, Ill. The road runs from Springfield to Mt. Olive, 43 miles. It was purchased by A. H. Joline, of New York, representing George Coppet, D. D. Withers and F. C. Hollins, the reorganization committee of the second mortgage bondholders. The price was $570,000. A new company will be formed to operate the road.

San Antonio & Aransas Pass.—The preliminary survey for the proposed extension from Houston, Tex., to Alexandria, La., has been completed from the former point to the Trinity River, a distance of about 44 miles. This section is now being located, and when this is done grading may be commenced.

San Francisco & North Pacific.—It is stated that an agreement has been made by this road to extend its lines north 200 miles to Crescent City, Cal., where connection is to be made with the proposed Grant's Pass & Crescent City road, to extend north from Crescent City, 87 miles. John T. Flynn is one of the projectors of the latter road.

Sault Ste. Marie & Southwestern.—A press dispatch from Fairchild, Wis., states that large quantities of rails are arriving daily at that point for this road, and that tracklaying was commenced Oct. 10, with the intention of completing the line through Wisconsin this winter.

The city of Rochester has been asked to grant the company $35,000 as a subsidy, the company agreeing to have its road completed to that point within a year.

Selma & Bessemer.—This company, chartered in Alabama last June, has filed new articles of association. The proposed road will run through the counties of Dallas, Perry, Bibb and Jefferson, the terminal points being Selma and Bessemer. The capital stock of the company has all been subscribed.

Sioux City & Northern.—Much of the grading on this line from Merrill northwest to Palisade City, Dak., 83 miles, has been completed, and tracklaying has been commenced at Garretson by the contractors, E. P. Reynolds & Co., of Beatrice, Neb.

South Carolina.—A special committee has been appointed by the Charleston Chamber of Commerce to take steps looking to the control of the South Carolina road in the interests of Charleston. No definite plan of action has been adopted.

Texas Trunk.—A motion of the company made to vacate the order of the Court appointing John H. Traylor Receiver for the Texas Trunk Railroad was argued at Dallas, Tex., last week. The Court overruled the motion, and the road for the present remains in the hands of the Receiver.

Topeka, Westmoreland & Marysville.—An election was held in Rossville, Silver Lake and Menoken townships, Kan., Oct. 8, for the purpose of voting bonds to aid in the building of the road. In Rossville the amount asked was $16,000, and the election gave a majority for the bonds of 94. Silver Lake was asked to vote $15,000, but the proposition was defeated by nine votes. Menoken was asked for $10,000, but the vote was against issuing the bonds.

Union Pacific.—The August statement of the system, including the roads in which half interest is owned, is as follows: Gross earnings, $3,816,195, an increase of $361,588; net earnings, $1,692,000, an increase of $265,548. For the eight months to Aug. 31 the gross earnings are $24,349,333, a decrease of $254,302; the net earnings, $8,948,432, an increase of $44,594.

Vaudreuil & Prescott.—About 15 miles of grading hes been finished on this road, which is being built from a connection with the Grand Trunk and Canadian Pacific at Vaudreuil, Que., to Ottawa. It is expected to have the line finished to Caledonia Springs early next season. The contract for the rails for the first 30 miles has just been awarded.

Western Counties.—The contractors for the construction of the Digby & Annapolis extension, Campbell & O'Neal, are finding the work more difficult than was anticipated. The most expensive section is between Digby and Bear River, where a bog five miles in length has to be encountered. In parts of this bog, the contractors state that they have driven piling 30 ft. without securing a firm foundation. The road is being built by the Dominion Government to connect the Western Counties and Windsor & Annapolis roads, and they will probably have to ask parliament next session to indemnify the contractors from the heavy loss which it is now apparent they will sustain in completing their contract.

Wheeling & Lake Erie.—The extension of this road from Bowerston, O., easterly, was recently suspended at Portland, three miles east of the Ohio River. Tracklaying was resumed last week south of Portland, and it is stated that the line will be built south to Wheeling instead of to Steubenville, as was at first proposed.

TRAFFIC.

Traffic Notes.

The Chicago & Eastern Illinois and the Toledo, St. Louis & Kansas City now advertise the "Cayuga Line" for freight and passenger business between Chicago and St. Louis.

The Central Vermont is to be equipped with new buffet vestibule sleeping cars by the Wagner Palace Car Co. The Pullman contract lapsed several months ago and will not be renewed.

Lake freight rates on ore from Escanaba to Cleveland have advanced to $1.15, and other points report a corresponding increase. Corn from Chicago to Buffalo has gone up to 2¾ cents per bushel.

Duluth, Brainerd and other Minnesota points have lately shipped large quantities of lumber to Winnipeg and beyond, which, in view of the import duty of $2 per 1,000 ft. levied by Canada, is regarded as somewhat remarkable.

The crowd of passengers at the Knight Templar Convention, at Washington, D. C., last week, was so great that the Pennsylvania was unable to indorse the return portion of iron-clad excursion tickets to the West, and had to ask Western roads to honor the tickets as they were. In this condition they were more available for the scalpers and the Western roads are said to have complained.

The Nebraska Board of Transportation has requested the various railroad companies to reduce rates, so that the freight on wheat shall not exceed 20c. from any Nebraska point to the Eastern markets, with the tariff on other grain in proportion. If the companies do not comply with the request within 15 days the secretaries are instructed to prepare a case for the Inter-state Commerce Commission. This is because of complaints from parties who wish the rates to Chicago reduced to a level with those to St. Louis.

The Texas & Pacific has two new steamboats recently built at Jeffersonville, Ind., for use on Red River between Shreveport and Alexandria, acting as feeders to the railroad. They are of very light draught, their carrying capacity being about 1,200 bales of cotton, but each boat is supplied with two barges and "will be able to move a large amount of cotton on a tolerably heavy dew." It is probable that most of the cotton gathered by the boats will be transferred at Alexandria to the Texas & Pacific for shipment to New Orleans. There are now two boats plying in Red River and the bayou between Jefferson and Alexandria, and handling a good deal of freight business.

The Inter-state Commerce Commission.

The Commission has, in an opinion by Commissioner Morrison, announced its decision of the case of James & Abbott against the East Tennessee, Virginia & Georgia and others. This is a complaint of the transportation charges on lumber carried from Johnson City, Tenn., to Boston, Mass. The Commission holds that combined rail and water competition at a longer distance point does not justify a greater charge for the shorter distance, while the shorter distance rate is maintained by the carrier at points where the competition is of greater force and more controlling than at the longer distance point.

The following quotation from this decision is published as bearing on the present practice of the Southwestern roads in applying through rates to cattle and freight that are unloaded at Kansas City and afterward forwarded to Chicago, but we have not seen the full decision: "When freight is taken up at Macon or elsewhere and delivered at Atlanta for sale or other purposes not incident or not necessary to through transportation, the shipment is complete, and when such freight is forwarded the carriage from Atlanta is a new undertaking."

The Commission, in an opinion by Chairman Cooley, has issued its decision in the cases of Abiel Leonard and Logan B. Chappelle against the Chicago & Alton Railroad Co. The main question in these cases was whether carriers can rightfully substitute for the practice of charging carload rates on cattle irrespective of weight, the rule that while a car-lot rate is named a minimum weight for carloads is prescribed, and any excess over the minimum is to be charged for by the 100 pounds in proportion to the car-lot rate. The Commission decides that this rule is not unlawful, and being more in proportion to the service rendered, it is prima-facie more just and reasonable than the practice it supplanted. Complainants mentioned the fact that by state law or the rulings of state commissioners shippers of cattle in Kansas and Missouri, to points within the state, had the right to load cars without regard to weight at a stated price per car. It was said that the rule was the same in some other states and the Commission was urged to conform thereto. The Commission holds that such state action is not a reason for adopting the like rule in inter-state traffic if that course is found not to be most just and politic. The grant to the federal government of the power to regulate inter-state commerce is full and complete and cannot be narrowed or encroached upon by state authority, either directly or indirectly. State action will always be treated with the highest deference and respect, but it cannot be allowed to control in matters within the federal jurisdiction.

The Commission on Monday announced its decision in the case of Henry McMorran and Edmund B. Harrington, millers at Port Huron, Mich., against the Grand Trunk and the Chicago & Grand Trunk. The opinion, written by Commissioner Schoonmaker holds: Though rates are not required to be made on a mileage basis, nor local rates to correspond with the divisions of a joint through rate over the same line, mileage is usually an element of importance, and due regard to distance proportions should be observed in connection with the other considerations that are material in fixing transportation charges. When rates on the line of a carrier are on their face disproportionate or relatively unequal, the burden is on the carrier to justify them when challenged. Grain and grain products classified alike are presumptively entitled to equal rates, and if a difference is made by a carrier it assumes the burden of sustaining it by satisfactory evidence. Upon complaint against the Grand Trunk for alleged unreasonableness of a rate of 8c. per 100 pounds on grain and 10c. on grain products from Port Huron to Buffalo, as compared with a through rate of 15c. from Chicago to Buffalo over the line formed by that road and the Chicago & Grand Trunk, it is held that, though the local rate from Port Huron to Buffalo might be regarded as disproportionate on the basis of distance alone, other considerations are involved, and in view of the terminal and ferry expenses at Port Huron, the Niagara bridge charges, and the Buffalo terminal expenses, all of which are borne by the Grand Trunk alone upon business originating at Port Huron, the complaint against the 8c. rate on grain is not sustained; but no good reason having been shown for a higher rate on grain products, that portion of the complaint is sustained, and the products ordered to be carried at the same rate as grain.

The Commission on Tuesday resumed the hearing, begun in May, of the Independent Refiners' Associations of Oil City and Titusville, Penn., against the Western New York & Pennsylvania, the Pennsylvania, the Erie and the Lehigh Valley. There are three questions at issue in the complaint; first, the rates between the oil region and the seaboard; second, the allegation that the difference in freight rates between oil transported in tank cars and in barrels amounts to a discrimination against complainants; and, thirdly, the contention that the railroad companies are bound to furnish tank cars to shippers, though generally such cars are furnished by the shippers. In connection with the hearing F. W. Babcock & Co., of Boston, submitted a printed statement alleging improper classification of oil and unjust discrimination by the railroads against Boston and in favor of New York. The Commission denied the request of the complainants for the production by the Pennsylvania road of a contract alleged to have been made in 1879 with the National Transit Co., by which the former was to be guaranteed 26 per cent. of all traffic from the oil regions, at the same rates for the pipe lines and railroads. Commissioner Morrison dissented.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all lines for the week ending Saturday, Oct. 12, amounted to 60,446 tons, against 59,246 tons during the preceding week, an increase of 1,200 tons, and against 62,039 tons during the corresponding week of 1888, a decrease of 1,593 tons. The proportions carried by each road were:

	W'k to Oct. 5.		W'k to Oct. 12.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	5,433	9.2	7,311	12.1
Wabash	4,731	8.0	3,859	6.3
Lake Shore & Michigan South.	10,500	17.7	10,717	17.8
Pitts., Ft. Wayne & Chicago	7,640	12.9	7,569	12.5
Chicago, St. Louis & Pitts.	8,583	14.5	8,717	14.4
Baltimore & Ohio	3,495	5.9	4,792	7.9
Chicago & Grand Trunk	8,323	14.0	7,416	12 3
New York, Chic. & St. Louis	3,386	5.7	3,408	5.7
Chicago & Atlantic	7,155	12.1	6,657	11.0
Total	59,246	100.0	60,446	100.0

Of the above shipments 2,466 tons were flour, 22,634 tons grain, 2,117 tons millstuffs, 6,237 tons cured meats, 3,027 tons lard, 9,375 tons dressed beef, 1,543 tons butter, 1,952 tons hides, 160 tons wool, and 5,774 tons lumber. The three Vanderbilt lines together carried 35.6 per cent., while the two Pennsylvania lines carried 26.9 per cent.